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Xylocampa lithoriza *Bork.* Askham Bog (*W.P.*); Beverley! (*N.F.D.*); Bishop's Wood, in March (*C.S.*); Doncaster (*W.W.*); Huddersfield (*J.V.*); Richmond (*J. Sang*); Scarborough (*T.W.*); York! (*P.I.*).

Cloantha solidaginis *Hüb.* Found on fir trees on moors, or in exposed woods having an undergrowth of bilberry, &c.

Askham Bog, one specimen at sugar (*W.P.*); Halifax! (*G.T.P.*); Huddersfield (*J.V.*); Saddleworth (*R. S. Edelston, Zool.*, 1844, ii. 734); Scarborough (*T.W.*); Sheffield (*A.D.*).

Calocampa vetusta *Hüb.* Bradford (*J.W.C.*); Huddersfield (*J.V.*); Pontefract (*B.H.*); Scarborough (*T.W.*); Sheffield (*A.D.*); Tankersley Park (*Rev. J. Johnson, Zool.*, 1847, v. 1658); York (*W.P.*).

Calocampa exoleta *L.* Generally common.

Askham Bog (*W.P.*); Barnsley (*J.H.*); Beverley! (*N.F.D.*); Bradford (*J.W.C.*); Bramham! (*J.Sm.*); Doncaster (*J. Hawley*); Huddersfield! (*G.T.P.*); Ilkley (*E.B.*); Leeds!! (*W.H.T.*); Pontefract (*B.H.*); Richmond (*J. Sang*); Scarborough!! (*Stainton's Manual*); Sheffield (*A.D.*); Wakefield (*W.T.*); York! (*T. Wilson*).

Xylina conformis *W.V.* = **furcifera** *Hufn.* In the Entomologists' Monthly Magazine, vol. v., p. 278, the late Mr. T. H. Allis recorded the capture of a specimen at Halifax "many years since." It was for a long time in his own collection, and afterwards in that of the late Mr. Thomas Wilkinson of Scarborough.

Xylina rhizolitha *W.V.* Not common.

Leeds, occasionally (*W.H.T.*); Pontefract (*B.H.*); York (*Stainton's Manual*).

Cucullia verbasci *L.* Barnsley (*J.H.*); Beverley, sometimes very common (*N.F.D.*); Jackdaw Crag near Tadcaster (*J.T.C., Proc. Yorksh. Nat. Club, July* 1, 1863,

p. 152); Market Weighton (*C.S.*); Selby (*T.F.*); Sheffield (*A.D.*); Wakefield (*W.T.*).

Cucullia chamomillæ *W.V.* Beverley (*N.F.D.*); Leeds, one at Meanwood, beginning of May, 1877 (*A. Denny*); Pontefract (*B.H.*); Wakefield (*W.T.*); York (*T. Wilson, Ent. Mo. Mag., Dec.*, 1870).

Cucullia umbratica *L.* Widely distributed.

Askham Bog (*W.P.*); Barnsley (*J.H.*); Beverley ! (*N.F.D.*); Bramham ! (*J.Sm.*); Huddersfield (*G.T.P.*); Oulton ! (*J.P.*); Pontefract (*B.H.*); Richmond (*J. Sang*); Scarborough (*T. W.*); Sheffield (*A.D.*); Wakefield (*W.T.*).

Heliothis marginata *Fab.* Common among *Ononis arvensis* on the coast.

In Holderness ! (*N.F.D.*); Redcar (*J. Sang*); Richmond (*J. Sang*); Scarborough !! (*G.T.P., J.H.R.*, and *T. W.*).

Heliothis armigera *Hüb.* A fine female example was taken at Scarborough by Mr. W. Simmons in 1866 (*Ent. Ann.*, 1867, *p.* 153); and Mr. H. Sims shewed me one he took at Haw Park, Wakefield, in October, 1871 (*Entom.* vi. 85). I know of no other.

Heliothis dipsacea *L.* Recorded as occurring at York by Mr. R. Cook (*Entom., Feb.*, 1842); also taken at York in 1859 (*R. Anderson, Ent. W. Int., Jan.* 21, 1860, *p.* 134).

Heliothis scutosa *Fab.* "On Strensall Common, near York" (*F.O.M., British Moths*, 1871, iii. 38). This requires confirmation.

Anarta myrtilli *L.* Abundant on heaths, flying in the hot sunshine.

Adel Moors !! (*W.H.T.*); Barnsley (*J.H.*); Beverley ! (*N.F.D.*); Blubberhouses (*Lord Walsingham*); Bradford ! (*J. W.C.*); Halifax !! (*G.T.P.*); Huddersfield !! (*G.T.P.*); Ilkley (*A. Denny*); Otley Chevin (*J. W.T.*);

Pateley Moors (*A. Denny*); Pontefract (*B.H.*); Richmond (*J. Sang*); Scarborough !! (*J.H.R.*); Selby (*T.F.*); Sheffield (*A.D.*); Thorne Waste (*W.P.*); York (*C. Helstrip*).

Heliodes arbuti *Fab.* Barnsley (*J.H.*); Beverley ! (*N.F.D.*); Bramham (*W.H.T.*); Doncaster (*W.W.*); Harrogate (*J. Sang*); Huddersfield (*J.V.*); Pontefract (*B.H.*); Pottern-newton near Leeds (*W.H.T.*); Richmond (*J. Sang*); Scarborough (*T.W.*); Sheffield (*A.D.*); Wakefield (*W.T.*); York ! (*Stainton's Manual*).

Hydrelia unca *L.* Known only to occur in Yorkshire at Askham Bog, York, where it "flies on sunny afternoons, and just before dusk" (*W.P.*).

Brephos parthenias *L.* Beverley, in Houghton Woods (*N.F.D., Nat., April*, 1882, *p.* 151); Bramham ! (*J.Sm.*); Doncaster (*W.W.*); Huddersfield (*J.V.*); Scarborough (*T.W.*); Sheffield (*A.D.*); Wharncliffe Woods (*T. W. Rose*); York ! (*T.H.A.* and *R.C.*).

Brephos notha *Hüb.* I fancy the preceding species is sometimes mistaken for this.

Bramham ! (*J.Sm.*); Sheffield (*A.D.*); Scarborough (*T.W.*); Sutton-on-Derwent near York (*Rev. G. Rudston Read, Ent. W. Int.*, 1858, *p.* 36); Wakefield (*W.T.*); York (*T.H.A.* and *R.C.*).

Abrostola urticæ *Hüb.* Common among stinging nettle.

Barnsley (*J.H.*); Beverley (*N.F.D.*); Bradford (*J.W.C.*); Bramham (*J.Sm.*); Flamborough Head (*E.H.*); Huddersfield ! (*G.T.P.*); Ilkley (*W.E.C.*); Leeds (*W.H.T.*); Pateley Bridge (*A. Denny*); Pontefract (*B.H.*); Richmond (*G.P.H.*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); Swillington (*J.W.T.*); Wakefield (*W.T.*); York (*T.H.A.*).

Abrostola triplasia *L.* Common among hop growing in gardens, &c.

Barnsley (*J.H.*); Bradford ! (*J.W.C.*); Bramham (*J.Sm.*); Hambleton (*G.T.*); Huddersfield ! (*G.T.P.*); Leeds !! (*W.H.T.*); Pontefract (*B.H.*); Rastrick (*G.T.P.*); Richmond (*G.P.H.*); Sheffield (*A.D.*); Wakefield (*W.T.*); York (*T. Wilson*).

Plusia chrysitis *L.* Generally very common among stinging nettles.

Askham Bog (*W.P.*); Barnsley (*J.H.*); Beverley ! (*N.F.D.*); Bradford ! (*J.W.C.*); Bramham ! (*J.Sm.*); Doncaster (*G.T.P.*); Flamborough Head (*E.H.*); Goole !! (*John Harrison*); Hambleton ! (*G.T.P.*); Huddersfield (*G.T.P.*); Ledsham (*C.S.*); Leeds ! (*W.H.T.*); Pontefract (*B.H.*); Richmond (*J. Sang*); Rotherham (*W. Thomas*); Scarborough (*J.H.R.*); Sheffield (*A.D.*); South Milford (*G.T.P.*); Wakefield (*W.T.*); Weeton (*W.D.R.*).

Plusia bractea *W.V.* York (*Stainton's Manual*); Pateley Bridge (*R.C., Newman's Entom., Oct.*, 1842); possibly these are the York specimens of Stainton's Manual. As this species occurs outside the county at "The Brushes," Staleybridge, I feel sure it ought to be taken oftener in similar localities within our boundary.

Plusia festucæ *L.* Not common. The larva feeds on the yellow flag (*Iris pseud-acorus*) in marshy ground.

Askham Bog (*W.P.*); Beverley (*N.F.D.*); Goole (*J. Harrison*); Huddersfield, very rare (*P.I.*); Hunslet, occurs in Middleton Wood, but is not common (*J.P.*).

Plusia iota *L.* Generally common.

Askham Bog (*W.P.*); Barnsley (*J.H.*); Beverley ! (*N.F.D.*); Bradford ! (*J.W.C.*); Bramham ! (*J.Sm.*); Driffield (*L. B. Ross*); Huddersfield ! (*G.T.P.*); Ilkley (*A. Denny*); Meanwood ! (*W.H.T.*); Pateley Bridge

(*A. Denny*); Pontefract (*B.H.*); Richmond (*J. Sang*); Rotherham (*W. Thomas*); Rothwell (*J.W.T.*); Scarborough (*Stainton's Manual*); Sheffield (*A.D.*); Wakefield (*W.T.*).

Plusia V-aureum *Gn.* As widely distributed and I think still commoner than *P. iota.*

Askham Bog (*W.P.*); Barnsley (*J.H.*); Beverley ! (*N.F.D.*); Bradford ! (*J.W.C.*); Bramham (*J.Sm.*); Flamborough Head (*E.H.*); Grassington (*G.T.P.*); Huddersfield ! (*G.T.P.*); Ilkley (*A. Denny*); Leeds (*E.B.*); Pontefract (*B.H.*); Richmond (*J. Sang*); Rotherham (*W. Thomas*); Scarborough (*J.H.R.*); Sheffield (*A.D.*); Wakefield (*W.T.*); York (*T. Wilson*).

Plusia gamma *L.* Abundant everywhere.

Plusia interrogationis *Hüb.* Occurs on the moors, the larvæ feeding on ling and bilberry.

Driffield (*G. R. Dawson, Entom.*, vii. 23); Harrogate (*J. Sang*); Hebden Bridge (*Tom Mellor*); Huddersfield (*J.V.*); "North Yorkshire Hills" (*N.F.D.*); Redcar (*G. Brook, F.L.S.*); Richmond (*G.P.H.* and *J. Sang*); Scarborough (*J.H.R.*); Sheffield (*A.D.*).

Gonoptera libatrix *L.* Generally common, but rare in some parts of the south West Riding. I have only seen two or three specimens in the Huddersfield district, though others have been taken there.

Askern (*S.L.M.*); Askham Bog (*W.P.*); Barnsley (*J.H.*); Beverley ! (*N.F.D.*); Bishop's Wood (*G.T.P.*); Boroughbridge (*W.P.*); Bradford (*J.W.C.*); Bramham ! (*J.Sm.*); Goole (*J. Harrison*); Huddersfield (*G.T.P.*); Hunslet ! (*J.P.*); Pontefract (*B.H.*); Richmond (*J. Sang*); Scarborough (*T.W.*); Selby (*K.R.*); Sheffield (*A.D.*); Wakefield (*W.T.*).

Amphipyra pyramidea *L.* One would expect this species to be plentiful in our larger oak and birch woods, but it seems to be not only local but seldom very common where it does occur.

Barnsley, rare (*J.H.*); Cusworth near Doncaster (*W.W.*); Sheffield (*A.D.*); Wakefield (*W.T.*); York (*Stainton's Manual*).

Amphipyra tragopogonis *L.* Common probably everywhere.

Mania typica *L.* Abundant no doubt everywhere.

Mania maura *L.* Not uncommon among old poplars and willows.

Adel Moor! (*W.H.T.*); Askham Bog (*W.P.*); Barnsley (*J.H.*); Beverley ! (*N.F.D.*); Bradford (*J.W.C.*); Bramham ! (*J.Sm.*); Huddersfield ! (*G.T.P.*); Ilkley (*A. Denny*); Leeds ! (*J.G.*); Pannal ! (*W.D.R.*); Pontefract (*B.H.*); Richmond (*J. Sang*); Scarborough (*G.T.*); Sheffield (*A.D.*); Wakefield (*W.T.*).

Toxocampa pastinum *Tr.* Local, but usually plentiful where it occurs. Its beautiful larvæ may readily be found about the end of May feeding on *Vicia* at night, or in the daytime coiled up among the moss, &c., above the roots of the eaten plants.

Askham Bog!! (*W.P.*); Bramham (*J.Sm.* and *J.W.T.*); Fairburn (*C.S.*); Maltby Wood near Sheffield, "sixty in one day" (*Wm. Laycock, Ent. W. Int.*, 1858, *p.* 133); Pontefract (*B.H.*); Scarborough ! (*G.T.P.* and *J.H.R.*); Sheffield ! (*A.D.* and others).

Stilbia anomala *Haw.* I have only seen one Yorkshire specimen; it was taken by Mr. J. W. Carter at Bradford on August 9th, 1877 (*G.T.P.*).

Catocala fraxini *L.* I am very glad to be able to record the occurrence of four specimens of this magnificent and rare species in our county. Dr. White took a fine speci-

men in his own garden near Barnsley on September 6th, 1880; Mr. T. Wilkinson took one at Scarborough in September, 1859, which I have seen; Mr. Jackson shewed me a beautiful example taken at rest on a tree in Stoneycliffe Wood, Middlestown, near Wakefield, on August 12th, 1875; and one is recorded from Hull in 1858 by Mr. James Young (*Ent. W. Int., p.* 203).

Catocala nupta *L.* This species, so common in many parts of England, is in our own county apparently as rare as is *C. fraxini.* I only know of one well authenticated specimen: it was taken by Mr. George Tyers of Leeds, "under the coping stone of the wall of Oliver's Mount School, on Aug. 24th, 1876."

Euclidia mi *L.* Widely distributed, but seldom very common. Askham Bog (*W.P.*); Barnsley (*J.H.*); Bishop's Wood (*G.T.P.*); Bramham ! (*J.Sm.*); Doncaster (*G. Tindall*); Huddersfield (*J.V.*); Pontefract (*B.H.*); Richmond (*J. Sang*); Scarborough (*T.W.*); Sheffield (*A.D.*); Wakefield (*W.T.*); Wentbridge (*J.W.T.*).

Euclidia glyphica *L.* Askham Bog (*W.P.*); Barnsley (*J.H.*); Bramham ! (*J.Sm.*); Doncaster (*W.W.*); Flamborough Head (*E.H.*); Huddersfield (*J.V.*); Pontefract (*B.H.*); Richmond (*J. Sang*); Roche Abbey (*W. H. Smith, Ent. W. Int., June* 12, 1858); Scarborough (*T.W.*); Sheffield (*A.D.*); Thorner (*G.T.*); Wakefield (*W.T.*).

Phytometra ænea *W.V.* Adel Moor !! (*W.H.T.*); Bramham ! (*J.Sm.*); Huddersfield (*J.V.*); Maltby Common (*J.H.*); Scarborough (*T.W.*); Sheffield (*A.D.*); Wakefield (*W.T.*); near York (*W.P.*).

DELTOIDES.

Hypena proboscidalis *L.* Abundant nearly all over the county, but least common in the south West Riding.

Hypena rostralis *L.* Sheffield (*A.D.*).

Hypenodes albistrigalis *Haw.* Scarborough (*T. W.*).

Hypenodes costæstrigalis *Steph.* Askham Bog (*W.P.*); Harrogate (*J. Sang*); Scarborough (*T. W.*).

Rivula sericealis *W.V.* York (*R.C.*).

Herminia barbalis *L.* Wakefield (*W.T.*); York (*Stainton's Manual*).

Herminia tarsipennalis *Tr.* Not uncommon.

Bramham ! (*J.Sm.*); Huddersfield (*P.I.*); Scarborough, "on wild raspberry" (*T. W.*); Sheffield (*A.D.*); York (*Stainton's Manual*).

Herminia grisealis *W.V.* Generally common.

Askham Bog (*W.P.*); Bishop's Wood (*G.T.P.*); Bramham ! (*J.Sm.*); Camblesforth (*John Harrison*); Edlington Wood (*J.H.*); Huddersfield (*G.T.P.*); Meanwood (*W.H.T.*); Richmond (*J. Sang*); Sheffield (*A.D.*); Thorne (*W. W.*); Wakefield (*W.T.*).

AVENTIÆ.

Aventia flexula *Fab.* We have two localities for this peculiar lichen feeder.

Scarborough (*T. W.*); York (*R.C., Entom., April*, 1842).

PYRALIDES.

Pyralis fimbrialis *W.V.* York (*R.C.*, also *J.T.C., Ent. W. Int., Feb.* 16, 1861).

Pyralis farinalis *L.* Abundant, probably everywhere.

Bradford (*J. W.C.*); Bramham ! (*J.Sm.*); Huddersfield !! (*G.T.P.*); Leeds !! (*W.H.T.*); Sheffield (*A.D.*); Wakefield (*W.T.*); York (*R.C.*).

Pyralis glaucinalis *L.* Askham Bog (*W.P.*); Scarborough (*T.W.*); Wakefield (*W.T.*).

Aglossa pinguinalis *L.* Common, probably everywhere. The larva feeds on chaff and straw.

Bradford ! (*J. W.C.*); Bramham (*J.Sm.*); Huddersfield (*G.T.P.*); Leeds (*W.H.T.*); Sheffield (*A.D.*); Wakefield (*W.T.*); York (*R.C.*).

Aglossa cuprealis *Hüb.* Recorded from Huddersfield, but I think in error (*G.T.P.*). Its larva feeds on chaff and old straw in stable corners, &c.

Cledeobia angustalis *W.V.* "In a meadow near Maltby Woods" (*J. Batty, Ent. W. Int., June* 27, 1857).

Pyrausta punicealis *W.V.* The larva feeds on *Nepeta cataria.*

Bramham ! (*J.Sm.*); Huddersfield (*P.I.*); Richmond (*J. Sang*); Scarborough ! (*J.H.R.*); Sheffield (*A.D.*); York (*Stainton's Manual*).

Pyrausta purpuralis *L.* Bramham ! (*J.Sm.*); Huddersfield (*J.V.*); Richmond (*J. Sang*); Sheffield (*A.D.*); Wakefield (*W.T.*); York (*R.C.*).

Pyrausta ostrinalis *Hüb.* Huddersfield (*P.I.*); Richmond (*J. Sang*); Scarborough (*T.W.*); York (*R.C.*).

Herbula cespitalis *W.V.* Bramham ! (*J.Sm.*); Huddersfield (*J.V.*); Richmond (*J. Sang*); Sheffield (*A.D.*).

Ennychia cingulalis *L.* Richmond (*J. Sang*).

Ennychia octomaculalis *L.* This pretty sun-loving species is not uncommon at Hebden Bridge (*G.T.P.*). Mr. Varley used to take it at Huddersfield not uncommonly,

but I have never seen it there, and I fear it is now extinct in the locality. The larva feeds on the golden rod (*Solidago virgaurea*).

Stenia punctalis *W.V.* Sheffield (*A.D.*).

Cataclysta lemnalis *L.* Askham Bog (*W.P.*); Bramham (*J.Sm.*); Huddersfield (*J.V.*); Wakefield (*W.T.*).

Paraponyx stratiotalis *L.* Askham Bog (*W.P.*); Bradford, one at Frizinghall in 1882 (*J.W.C.*); Scarborough, not uncommon (*T.W.*); Sheffield (*A.D.*).

Hydrocampa nymphæalis *L.* Common in suitable localities.

Askham Bog (*W.P.*); Bradford !! (*J.W.C.*); Bramham ! (*J.Sm.*); Goole (*J. Harrison*); Huddersfield (*G.T.P.*); Killingbeck near Leeds (*J.W.T.*); Scarborough (*J. Harrison*); Sheffield (*A.D.*); Wakefield (*W.T.*).

Hydrocampa stagnalis *Don.* The larva feeds on *Sparganium simplex.*

Askham Bog (*W.P.*); Bramham ! (*J.Sm.*); Goole (*J. Harrison*); Huddersfield (*J.V.*); Scarborough (*J. Harrison*); Sheffield (*A.D.*); Wakefield (*W.T.*).

Acentropus niveus *Ol.* Has occurred near York (*Ent. W. Int.*, vi. 171). The larva feeds on *Potamogeton crispus.*

Botys pandalis *Hüb.* The larva will eat *Solidago virgaurea*, *Origanum vulgare*, and *Teucrium scorodonia.*

Sheffield (*A.D.*); York (*Stainton's Manual*).

Botys verticalis *W.V.* Among stinging nettle.

Bingley (*J.W.C.*); Bishop's Wood (*W.P.*); Goole (*J. Harrison*); Huddersfield (*G.T.P.*); Wadsley Bridge near Sheffield (*A.D.*); Wakefield (*W.T.*); York (*R.C.*).

Botys fuscalis *W.V.* The larva feeds on *Melampyrum pratense* and *M. cristatum.*

Askham Bog (*W.P.*); Blubberhouses (*Lord Walsingham*); Bradford (*J. W.C.*); Harrogate (*J. Sang*); Huddersfield (*Hobkirk's History of Huddersfield*); Richmond (*J. Sang*); Sheffield (*A.D.*).

Botys terrealis *Tr.* The larva feeds on the golden-rod (*Solidago virgaurea*).

Scarborough (*T. W.*).

Botys urticalis *L.* Among stinging nettles.

Askham Bog (*W.P.*); Bradford ! (*J. W.C.*); Goole (*J. Harrison*); Huddersfield, not common (*G.T.P.*); Leeds ! (*W.H.T.*); Pannal ! (*W.D.R.*); Richmond (*J. Sang*); Selby (*K.R.*); Sheffield (*A.D.*); Wakefield (*W.T.*).

Ebulea crocealis *Tr.* The larva feeds on fleabane (*Inula dysenterica*).

Doncaster ! (*G.T.P.*); Flamborough Head (*E.H.*); Redcar (*J. Sang*); Scarborough (*T. W.*); Sheffield (*A.D.*).

Ebulea verbascalis *W.V.* The larva feeds on *Teucrium scorodonia*.

Only recorded from Sheffield (*A.D.*).

Ebulea sambucalis *W.V.* Moderately common, sometimes abundant. I once saw an elder tree in my father's garden, the lower branches of which were fairly stripped by the larvæ.

Askham Bog (*W.P.*); Bradford (*J. W.C.*); Goole (*J. Harrison*); Halifax (*G.T.P.*); Huddersfield !(*G.T.P.*); Leeds !! (*W.H.T.*); Sheffield (*A.D.*); Wakefield (*W.T.*).

Pionea forficalis *L.* Abundant in kitchen gardens, &c., everywhere.

Spilodes sticticalis *L.* Local and apparently not so common as formerly.

Bramham (*J.Sm.*); Halifax (*Stainton's Manual*); Huddersfield, in August, 1847 (*P.I.*); Redcar (*J. Sang*); Scarborough, formerly abundant (*T. W.*); York, in 1879 (*T. Wilson*).

Scopula lutealis *Haw.* Abundant, probably everywhere. I have found the larvæ freely at Huddersfield, feeding on the leaves on the lower branches of bramble (*Rubus*), also on *Plantago lanceolata*, *Ranunculus*, *Rumex*, and other low plants.

Scopula olivalis *W. V.* Occurs everywhere and is abundant in most places. Least common in some parts of the south West Riding. The larva feeds on stinging nettle and other low plants.

Scopula prunalis *W. V.* Also occurs everywhere, and usually in abundance. The larva feeds on *Scorodonia*, *Stachys sylvatica*, *Lamium galeobdolon*, &c.

Scopula ferrugalis *Hüb.* Harrogate (*J. Sang*); Scarborough (*T. W.*).

Stenopteryx hybridalis *Hüb.* I have reared the larvæ on *Polygonum aviculare*, but the proper food plant is uncertain. Askham Bog (*W. P.*); Flamborough Head (*E. H.*); Richmond (*J. Sang*); Sheffield (*A. D.*); Thorne Waste (*W. P.*); Wakefield (*W. T.*).

Scoparia ambigualis *Tr.* Abundant everywhere.

Scoparia conspicualis *Hodgk.* This species was only separated and named as distinct in 1881 by Mr. Hodgkinson, although that gentleman had been familiar with it at Windermere for some years. Mr. W. Prest had also been taking it for years, and this year (1882) collected it in plenty at Sandburn, York; and on seeing some of Mr. Prest's specimens I at once recognized it as a species I had taken several years previously at Edlington Wood, near Doncaster, from which locality I had still a few good specimens in my duplicate boxes.

Scoparia basistrigalis *Knaggs.* On Bank holiday, August 4th, 1879, I and others found this fine and local species in the greatest profusion in Edlington Wood, near Doncaster.

A dozen or more were frequently seen on the trunk of a single tree. Since then it has been much scarcer, and this year (1882) I failed to find a single specimen. Mr. W. Prest has also taken it at Bishop's Wood near Selby, and at York.

Scoparia cembræ *Haw.* Widely distributed and common.

The form occurring at Huddersfield is the variety **Zelleri** *Wocke*, which still stands in some of our lists as a distinct species. The species used to fly in thousands in two rough fields adjoining my house at Highroyd, Huddersfield, but I believe they were all of this form except an occasional specimen of Dr. F. B. White's dark variety *scotica*. Whether the specimens taken in the other parts of the county are the typical *cembræ* I do not know, but it would be interesting to ascertain how far the variety extends.

Askham Bog (*W.P.*); Bradford (*J. W.C.*); Bramham ! (*J.Sm.*); Harrogate (*J. Sang*); Huddersfield !! (*G.T.P.*); Redcar (*J. Sang*); Scarborough (*T. W.*); Sheffield (*A.D.*).

Scoparia pyralalis *W.V.* Generally common.

Bramham (*J.Sm.*); Edlington Wood (*G.T.P.*); Harrogate (*J. Sang*); Huddersfield !! (*G.T.P.*); Richmond (*J. Sang*).

Scoparia muralis *Gn.* Widely distributed and often abundant. In the south West Riding the larvæ may be collected in profusion by stripping off the moss growing on old walls.

Bradford (*J. W.C.*); Huddersfield !! (*G.T.P.*); Richmond (*J. Sang*); Saddleworth !! (*G.T.P.*); Scarborough (*T. W.*); Sheffield (*A.D.*).

Scoparia lineolalis *Gn.* Doncaster (*Stainton's Manual*); Redcar (*J. Sang*).

Scoparia mercuralis *L.* Askham Bog (*W.P.*); Huddersfield (*S.L.M.*); Sheffield (*A.D.*).

Scoparia cratægalis *Hüb.* Askham Bog (*W.P.*); Bingley (*E.P.P.B.*); Bramham (*J.Sm.*); Edlington Wood (*G.T.P.*); Richmond (*J. Sang*); Sheffield (*A.D.*).

Scoparia resinalis *Haw.* Not common.

Scarborough, on ash trees (*T.W.*); Sheffield (*A.D.*).

Scoparia truncicolalis *Stainton.* Fairly common. I have reared the larvæ through on moss.

Grassington (*G.T.P.*); Huddersfield (*G.T.P.*); Scarborough (*T.W.*); Sheffield (*A.D.*); York !! (*W.P.*).

Scoparia coarctalis *Zell.* Huddersfield (*G.T.P.*); Redcar (*J. Sang*); Scarborough (*T.W.*).

Scoparia pallidulalis *Gn.* Only occurs I believe on marshy ground.

"On warm moist evenings this species is to be seen sporting in countless numbers in Askham Bog near York" (*W.P.*); Scarborough (*T.W.*).

CRAMBITES.

Crambus pratellus *L.* Common everywhere.

Crambus dumetellus *Hüb.* Recorded from York by Mr. Robt. Cook (*Newman's Entom.*, *April*, 1842); Blubberhouses (*Lord Walsingham*).

Crambus hamellus *Thunb.* Scarborough (*T.W.*).

Crambus pascuellus *L.* Rather common.

Askham Bog (*W.P.*); Bramham ! (*J.Sm.*); Redcar (*J. Sang*); Sheffield (*A.D.*); Thorne Waste near Goole !! (*G.T.P.*).

Crambus margaritellus *Hüb.* Local, but probably common where it occurs. I found it abundant on the damp parts only of Thorne Waste, whereas *C. pascuellus* only occurred on the dry parts.

Rombald's Moor near Bradford (*J. W. C.*); Thorne Waste near Goole !! (*G. T. P.*); York (*E. B.*).

Crambus pinetellus *L.* Sheffield (*A. D.*).

Crambus perlellus *Scop.* Askham Bog (*W. P.*); Richmond (*J. Sang*); Thorne Waste (*W. W.*).

Crambus Warringtonellus *Zell.* Occurs commonly on Thorne Waste (*W. P.* and *W. W.*); but we have no other locality as yet. I believe the northern specimens of this insect are simply a form of *C. perlellus*. Except in the New Forest I have never found the two species occurring separately; and in a field in the Isle of Man I found all the intermediate varieties between one form and the other. The New Forest specimens seem to me altogether darker and have a more irony appearance than any I have taken in the north, but even they may only be an isolated race of a form of *C. perlellus*.

Crambus selasellus *Hüb.* Askham Bog (*W. P.*); Bishop's Wood (*W. P.*); Scarborough (*T. W.*).

Crambus tristellus *W. V.* Abundant everywhere.

Crambus inquinatellus *W. V.* Scarborough (*T. W.*); Stockton-on-the-Forest, and Sandburn, York (*W. P.*).

Crambus geniculellus *Haw.* Redcar (*J. Sang*).

Crambus culmellus *L.* Abundant everywhere.

Crambus hortuellus *Hüb.* Abundant everywhere.

Chilo phragmitellus *Hüb.* Askham Bog (*W. P.*); formerly abundant at Scarborough (*T. W.*).

Schœnobius forficellus *Thunb.* Askham Bog (*W. P.*); Huddersfield (*P. I.*).

Schœnobius gigantellus *W. V.* Recorded as having occurred at York by Mr. R. Cook (*Newman's Entom.*, *April*, 1842).

Anerastia lotella *Hüb.* A coast species.
Redcar (*J. Sang*).

Homæosoma nimbella *Dup.* Flamborough Head (*E.H.*); larvæ in seeds of yarrow, &c., at Scarborough (*T.W.*).

Mr. Sang records the variety **saxicola** *Vaughan* from Redcar, and I think it probable that the form occurring in the two other localities is this variety.

Homæosoma nebulella *Hüb.* Not common. The larvæ feed in thistle heads in the autumn.

Flamborough Head (*E.H.*); Scarborough (*T.W.*).

Ephestia elutella *Hüb.* Probably common in suitable places in all the larger towns. In a chicory warehouse at York Mr. G. C. Dennis obtained in one piece from the ceiling a tough compact web spun by thousands of larvæ, measuring between seven and eight feet in length, and four feet in width (see Transactions of Yorkshire Naturalists' Union, part i., 1877); Huddersfield (*G.T.P.*); York !! (*W.P.*).

Ephestia ficella *Dougl.* Leeds (*E.B.*); York (*W.P.*).

Ephestia pinguedinella *Gn.* Balby ! (*W.W.*); Sheffield (*A.D.*); York (*W.P.*).

Cryptoblabes bistriga *Haw.* A scarce species but has repeatedly been taken.

Doncaster (*W.W.*); Huddersfield (*P.I.*); York (*W.P.* and *T. Wilson*).

Plodia interpunctella *Hüb.* The larva feeds in warehouses on grain, malt, locust beans, &c.

York (*W.P.*).

Phycis betulella *Goetz.* The larvæ may be found on the upper side of birch leaves, at the end of May.

Bramham (*J.Sm.*); common in the Green Farm Wood, adjoining Sandal Beat, Doncaster (*G.T.P.* and *W.W.*); Sheffield (*A.D.*); York (*W.P.*).

Phycis carbonariella *Fisch.* Plentiful probably on all heaths, and very partial to the burnt charred parts. No species is more appropriately named than this, for the larva, imago, and habitat are all equally black.

Blubberhouses (*Lord Walsingham*); Flamborough Head (*E.H.*); Goole Moors (*J. Harrison*); Halifax !! (*G.T.P.*); Huddersfield !! (*G.T.P.*); Leeds (*E.B.*); Richmond (*J. Sang*); Saddleworth (*R. S. Edelston*); Scarborough (*T. W.*); Sheffield (*A.D.*); Strensall Common, York ! (*W.P.*); Thorne Waste ! (*G.T.P.*).

Phycis ornatella *W.V.* Only recorded from one locality. York (*W. Simmons*).

Phycis abietella *W.V.* Not uncommon at Scarborough (*T. W.*); York (*W.P.*).

Phycis roborella *W.V.* Bishop's Wood ! (*W.P.*); Bramham ! (*J.Sm.*); Doncaster ! (*W. W.*); York (*W.P.*).

Pempelia palumbella *W.V.* Sheffield (*A.D.*); York !! (*W.P.*).

Rhodophæa consociella *Hüb.* Not generally common. Rossington ! (*W. W.*); Scarborough (*T. W.*); York (*T. Wilson*).

Rhodophæa advenella *Zinck.* Only recorded from Scarborough (*T. W.*).

Rhodophæa tumidella *Zinck.* About oak trees. Askham Bog and Sandburn, York (*W.P.*); Bramham (*J.Sm.*); Doncaster ! (*W. W.*); Scarborough (*T. W.*).

Oncocera ahenella *W.V.* Huddersfield (*P.I.*); Stainton's Manual also gives "the West Riding of Yorkshire," probably referring to the above record, but I think the specimen must have got there accidentally somehow, as the locality is a most unlikely one for the species.

Melia sociella *L.* Goole (*G.T.P.*); Leeds (*E.B.*); Richmond (*J. Sang*); Sheffield (*A.D.*).

Melissoblaptes cephalonica *Stainton.* This species was first described and introduced to science (*Ent. Ann.*, 1866, *p.* 147) from specimens bred from dried currants at York

by Mr. Hind in 1865. Since then it has been taken in London by Mr. C. G. Barrett (to whom I am indebted for my series of the species), but I know of no other captures (*G.T.P.*).

Galleria cerella *Gn.* The larva feeds in the comb in old bee-hives. Leeds (*E.B.*).

Meliphora alvearíella *Gn.* Plentiful wherever old bee-hives are kept.

Huddersfield !! (*G.T.P.*); Leeds (*E.B.*); Sheffield (*A.D.*); York (*R.C.*).

TORTRICES.

Halias prasinana *L.* Generally common, but less so in the south West Riding than elsewhere.

Bingley (*E.P.P.B.*); Bishop's Wood (*W.D.R.*); Bramham ! (*J.Sm.*); Doncaster ! (*W.W.*); Edlington Wood ! (*G.T.P.*); Harrogate (*J. Sang*); Huddersfield (*G.T.P.*); Meanwood ! (*W.D.R.*); Richmond (*J. Sang*); Scarborough !! (*T.W.*); Sheffield (*A.D.*); York (*R.C.*).

Sarrothripa revayana *W.V.* Scarce.

Scarborough (*T.W.*); near York (*J.T.C., Ent. Ann.*, 1867, *p.* 158).

Tortrix pyrastrana *Hüb.*=**podana** *Scop.* Common everywhere, probably.

Tortrix cratægana *Hüb.* = **roborana** *Hüb.* A pretty species and not rare.

Bramham ! (*J.Sm.*); Doncaster (*W.W.*); Edlington Wood (*G.T.P.*); Huddersfield (*P.I.*); Sheffield (*A.D.*); York (*W.P., Ent. W. Int., Feb.* 16, 1861).

Tortrix xylosteana *L.* ? Common everywhere.

Tortrix sorbiana *Hüb.* Rather common.

Bishop's Wood (*W.P.*); Bramham ! (*J.Sm.*); Doncaster (*W.W.*); Huddersfield (*J.W.D.*); Sheffield (*A.D.*); York (*R.C.*).

Tortrix rosana *L.* Very common, no doubt everywhere.

Tortrix cinnamomeana *Tr.* Doncaster (*W.W.*); York (*W.P.*).

Tortrix heparana *W.V.* Common everywhere.

Tortrix ribeana *Hüb.* Also common everywhere.

Tortrix corylana *Hüb.* Generally common.

Bramham ! (*J.Sm.*); Edlington Wood ! (*G.T.P.*); Elland (*G.T.P.*); Harrogate (*J.Sang*); Huddersfield ! (*G.T.P.*); Sheffield (*A.D.*); York (*R.C.*).

Tortrix unifasciana *Dup.* Blubberhouses (*Lord Walsingham*); Doncaster (*W.W.*); Huddersfield (*G.T.P.*); Redcar (*J. Sang*); Sheffield (*A.D.*).

Tortrix costana *W.V.* Doncaster (*W.W.*); Huddersfield (*P.I.*); Sheffield (*A.D.*); York (*C. G. Barrett, Ent. Mo. Mag.*, 1873).

Tortrix viburnana *W.V.* Common on heaths, &c.

Blubberhouses (*Lord Walsingham*); Huddersfield (*P.I.*); Richmond (*J. Sang*); Scarborough (*T.W.*); Sheffield (*A.D.*); Thorne Waste !! (*G.T.P.*); York !! (*W.P.*).

Tortrix icterana *Fröl.* The larva feeds on *Plantago* and *Centaurea nigra*.

Blubberhouses (*Lord Walsingham*); Bramham ! (*J.Sm.*); Doncaster (*W.W.*); Flamborough Head (*E.H.*); Richmond (*J. Sang*); Scarborough (*T.W.*); Sheffield (*A.D.*); Wakefield (*G.T.P.*).

Tortrix viridana *L.* Abundant everywhere.

Tortrix ministrana *L.* Common.
Bramham! (*J.Sm.*); Doncaster! (*W.W.*); Harrogate (*J. Sang*); Huddersfield! (*G.T.P.*); Richmond (*J. Sang*); Sheffield (*A.D.*); York (*R.C.*).

Tortrix adjunctana *Tr.*=**Forsterana** *Dup.?* Common.
Bramham! (*J.Sm.*); Huddersfield! (*G.T.P.*); Leeds (*C.S.*); Richmond (*J. Sang*); York (*R.C.*).

Tortrix Branderiana *L.* Taken at Sheffield by Mr. A. Doncaster, but as yet recorded from no other locality in the county.

Dichelia Grotiana *Fab.* York (*R.C.*, *Newman's Entom.*, *April*, 1842).

Amphysa Gerningana *W.V.* Huddersfield (*G.C.B.M.*); Richmond (*J. Sang*); Scarborough (*T.W.*); Thorne (*W.W.*); York !! (*W.P.*).

Amphysa Walkerana *Curt.* Huddersfield (*P.I.*).

Leptogramma literana *L.* Bramham (*J.Sm.*); Doncaster (*W.W.*); Richmond (*J. Sang*); Scarborough! (*T.W.*); Sheffield (*A.D.*); Stockton-on-the-Forest, near York (*W.P.*); York (*R.C.*).

Leptogramma scabrana *Fab.* York (*R.C.*).

Leptogramma boscana *Fab.* Flamborough (*Rev. E. Horton*, *Ent. W. Int.*, 1858, *p.* 131).
This really is only a form of *L. Scabrana.*

Peronea sponsana *Fab.*=**favillaceana** *Hüb.* Common.
Bramham! (*J.Sm.*); Huddersfield, abundant in beech hedges bordering gardens, &c. (*G.T.P.*); Market Weighton !! (*W.P.*); Richmond (*J. Sang*); Sheffield (*A.D.*).

Peronea autumnana *Hüb.* = **rufana** *W.V.* Huddersfield (*P.I.*); Scarborough, abundant on willow and *Myrica gale* (*T.W.*); York (*R.C.*).

Peronea mixtana *Hüb.* Not uncommon on heaths.

Huddersfield (*P.I.*); Richmond (*J. Sang*); Scarborough, abundant on *Erica tetralix* and *E. cinerea* (*T. W.*); Sheffield (*A.D.*).

Peronea Schalleriana *L.* Common.

Blubberhouses (*Lord Walsingham*); Bramham ! (*J.Sm.*); Doncaster (*W. W.*); Edlington Wood (*G.T.P.*); Harrogate (*J. Sang*); Huddersfield (*P.I.*); Richmond (*J. Sang*); Scarborough (*T. W.*); Sheffield (*A.D.*); York (*R.C.*).

Peronea comparana *Hüb.* Bishop's Wood (*W.P.*); Doncaster (*W. W.*); Harrogate (*J. Sang*); Richmond (*J. Sang*).

Peronea comariana *Zell.* Bramham (*J.Sm.*).

Peronea Caledoniana *Bent.* Blubberhouses (*Lord Walsingham*); Huddersfield (*J. W.D.*); Richmond (*J. Sang*); Sheffield (*A.D.*).

Peronea variegana *W. V.* An exceedingly variable species, abundant in hawthorn hedges everywhere.

Peronea cristana *W. V.* York (*R.C.*).

Peronea hastiana *L.* The larva feeds on sallow, willow, and *Myrica gale.*

Richmond (*J. Sang*); Scarborough (*T. W.*); Strensall Common (*P.I.*).

Peronea ferrugana *W. V.* Bramham ! (*J.Sm.*); Harrogate (*J. Sang*); Richmond (*J. Sang*); York (*R.C.*).

Peronea tristana *Hüb.* Bramham (*J.Sm.*); Huddersfield (*P.I.*); Strensall Common (*P.I.*).

Peronea aspersana *Hüb.* Feeds on *Spiræa filipendula*, &c.

Bramham ! (*J.Sm.*); Flamborough Head (*E.H.*); Harrogate (*J. Sang*); Richmond (*J. Sang*); Scarborough (*T. W.*); York (*R.C.*).

Teras caudana *Fab.* I have bred this singular species freely from poplar.

Bishop's Wood (*W.P.*); Bramham ! (*J.Sm.*); Doncaster (*W.W.*); Harrogate (*J. Sang*); Huddersfield ! (*G.T.P.*); Richmond (*J. Sang*); Sheffield (*A.D.*); York (*R.C.*).

Teras contaminana *Hüb.* Abundant among hawthorn everywhere.

Dictyopteryx Lœflingiana *L.* Common.

Bramham ! (*J.Sm.*); Doncaster (*W.W.*); Harrogate (*J. Sang*); Huddersfield (*G.C.B.M.*); Richmond (*J.Sang*); Sheffield (*A.D.*); York (*R.C.*).

Dictyopteryx Holmiana *L.* Generally common about hawthorn.

Bramham! (*J.Sm.*); Doncaster (*W.W.*); Huddersfield (*P.I.*); Redcar (*J. Sang*); Sheffield (*A.D.*); York (*R.C.*).

Dictyopteryx Bergmanniana *L.* Abundant among rose bushes no doubt everywhere.

Dictyopteryx Forskaleana *L.* Common among maple.

Boroughbridge (*W.P.*); Bramham ! (*J.Sm.*); Hexthorpe (*W.W.*); Huddersfield (*P.I.*); Sheffield (*A.D.*); York (*R.C.*).

Argyrotoza Conwayana *Fab.* Very common.

Bishop's Wood (*W.P.*); Boroughbridge (*W.P.*); Bramham ! (*J.Sm.*); Doncaster (*W.W.*); Edlington Wood, in plenty by beating yews (*G.T.P.*); Harrogate (*J. Sang*); Huddersfield (*P.I.* and *G.C.B.M.*); Richmond (*J. Sang*); York (*R.C.*).

Ptycholoma Lecheana *L.* Very common.

Bishop's Wood (*W.P.*); Bramham ! (*J.Sm.*); Doncaster (*W.W.*); Harrogate (*J. Sang*); Huddersfield (*P.I.*); Richmond (*J. Sang*); Scarborough (*T.W.*); Sheffield (*A.D.*); York (*R.C.*).

Ditula Hartmanniana *L.* Scarborough (*T. W.*).

Ditula semifasciana *Haw.* Among sallows.
Scarborough (*T. W.*).

Penthina corticana *Hüb.*=**picana** *Fröl.* Common.
Bramham! (*J. Sm.*); Doncaster (*W. W.*); Huddersfield (*G. C. B. M.*); Scarborough (*T. W.*); Sheffield (*A. D.*); York (*W. P.*).

Penthina betulætana *Haw.* Doncaster (*W. W.*); Huddersfield (*P. I.*); York (*R. C.*).

Penthina prælongana *Gn.*=**sororculana** *Zett.* On birch trees.
Bramham! (*J. Sm.*); Huddersfield (*P. I.*); Richmond (*J. Sang*); Scarborough (*T. W.*); Sheffield (*A. D.*); York (*W. P.*).

Penthina pruniana *Hüb.* Apparently common everywhere.

Penthina cynosbana *L.*=**variegana** *Hüb.* Common, no doubt everywhere.

Penthina ochromelana *Gn.*=**dimidiana** *Treit.* Bramham (*J. Sm.*); Huddersfield (*P. I.*).

Penthina sauciana *Hüb.* Abundant at Blackhills near Bingley in 1882 (*E. P. P. B.*); Scarborough (*T. W.*); Sheffield (*A. D.*).

Penthina gentianana *Curt.* Larva feeds in seed-heads of teazle (*Dipsacus sylvestris*).
Doncaster (*W. W.*).

Penthina marginana *Haw.* Richmond (*J. Sang*); Scarborough, in seed-heads of *Scabiosa* (*T. W.*).

Penthina fuligana *Hüb.*=**carbonana** *Dbl.* Scarborough (*T. W.*).

Antithesia salicana *Gn.* Bramham (*J. Sm.*).

Spilonota ocellana *W.V.* Common.

Askham Bog (*W.P.*); Bramham! (*J.Sm.*); Doncaster (*W.W.*); Harrogate (*J. Sang*); Redcar (*J. Sang*); Richmond (*J. Sang*); York, bred from plum (*G. C. Dennis*).

Spilonota lariciana *Zell.* Mr. W. Warren used to find this species at Doncaster "flying round young larches at dusk, in company with *T. cinnamomeana* and *P. occultana*."

Spilonota dealbana *Fröl.* Doncaster (*W.W.*); Harrogate (*J. Sang*); Sheffield (*A.D.*).

Spilonota neglectana *Dup.* Bramham! (*J.Sm.*); Huddersfield (*Hobkirk's History of Huddersfield*); Sheffield (*A.D.*).

Spilonota suffusana *Kollar.* Bramham! (*J.Sm.*); Doncaster (*W.W.*); Huddersfield (*P.I.*); Redcar (*J. Sang*); Sheffield (*A.D.*).

Spilonota roborana *W.V.* Bramham! (*J. Sm.*); Doncaster (*W.W.*); Harrogate (*J. Sang*); Richmond (*J. Sang*); Sheffield (*A.D.*).

Pardia tripunctana *W.V.* Probably everywhere.

Blubberhouses (*Lord Walsingham*); Bramham! (*J.Sm.*); Doncaster (*W.W.*); Harrogate (*J. Sang*); Huddersfield (*P.I.*); Redcar (*J. Sang*); Richmond (*J. Sang*); Sheffield (*A.D.*).

Aspis Udmanniana *L.* Common. The larva feeds on bramble.

Bramham! (*J.Sm.*); Doncaster (*W.W.*); Huddersfield! (*G.T.P.*); Sheffield (*A.D.*).

Sericoris lacunana *W.V.* Common no doubt everywhere.

Sericoris urticana *Hüb.* Also plentiful probably everywhere.

Sericoris micana *Hüb.* Scarborough (*T.W.*).

Mixodia Schulziana *Fab.* Huddersfield (*G.C.B.M.*); Richmond (*J. Sang*); Sheffield (*A.D.*).

Mixodia Ratzburghiana *Sax.* Scarborough, among firs (*T. W.*).

Roxana arcuana *L.* Edlington Wood (*W. W.*); Scarborough (*T. W.*).

Orthotænia antiquana *Hüb.* Huddersfield (*P. I.*).

Orthotænia striana *W. V.* Bramham ! (*J. Sm.*); Doncaster (*W. W.*); Huddersfield (*P. I.*).

Orthotænia ericetana *Bent.* "One at Stockton-on-the-Forest in 1877" (*W. P.*).

Phtheocroa rugosana *Hüb.* Larva feeds in the berries of *Bryonia dioica*.

Bramham (*J. Sm.*); Doncaster (*W. W.*); York (*T. Wilson*).

Cnephasia lepidana *Curt.* = **politana** *Haw.* Found on heaths.

Richmond (*J. Sang*); Scarborough, abundant among bilberry (*T. W.*).

Cnephasia musculana *Hüb.* Abundant, probably everywhere.

Bishop's Wood (*W. P.*); Bramham ! (*J. Sm.*); Doncaster (*W. W.*); Harrogate (*J. Sang*); Huddersfield (*P. I.*); Redcar (*J. Sang*); Richmond (*J. Sang*).

Sciaphila nubilana *Hüb.* Common.

Harrogate (*J. Sang*); Huddersfield (*G. T. P.*); Sheffield (*A. D.*).

Sciaphila subjectana *Steph.* Common.

Blubberhouses (*Lord Walsingham*); Bramham ! (*J. Sm.*); Doncaster (*W. W.*); Harrogate (*J. Sang*); Huddersfield (*G. T. P.*); Redcar (*J. Sang*); Richmond (*J. Sang*); Sheffield (*A. D.*).

Sciaphila virgaureana *Tr.* Also abundant, probably everywhere.

Doncaster (*W. W.*); Harrogate (*J. Sang*); Huddersfield (*G. T. P.*); Redcar (*J. Sang*); Richmond (*J. Sang*); Sheffield (*A. D.*); York (*R. C.*).

Sciaphila chrysantheana *Dup.*=**alternana** *W. V.* Larva feeds in the ox-eye daisy, and probably other compositæ.

Redcar (*J. Sang*).

Sciaphila pascuana *Stn.* ?=**pasivana** *Hüb.* Some larvæ I collected in the flowers of *Ranunculus bulbosus* in a rough field adjoining Lepton Great Wood, Huddersfield, in 1882, produced this species freely, along with plenty of *S. ictericana* and one specimen of *S. octomaculana* (*G. T. P.*).

Sciaphila hybridana *Hüb.* Common.

Bramham (*J. Sm.*); Doncaster (*W. W.*); Huddersfield (*P. I.*); Redcar (*J. Sang*); Richmond (*J. Sang*).

Sciaphila octomaculana *Haw.* ? I have bred this species from *Ranunculus* flowers, but it also feeds on thistle, and no doubt, like so many of its congeners, on numerous other plants. It is widely distributed and common in the county.

Blubberhouses (*Lord Walsingham*); Huddersfield (*G. T. P.* and *P. I.*); Scarborough (*T. W.*); Sheffield (*A. D.*).

Sphaleroptera ictericana *Haw.* I bred this freely in July, 1882, from larvæ collected the previous month with those of *S. pascuana* in flowers of *Ranunculus bulbosus* in a field adjoining Lepton Great Wood, Huddersfield (*G. T. P.*).

Capua ochraceana *Steph.* Doncaster (*W. W.*); Edlington Wood (*G. T. P.*); Huddersfield (*P. I.*).

Clepsis rusticana *Tr.* Huddersfield (*P. I.*); Richmond (*J. Sang*).

Bactra lanceolana *Hüb.* Common in damp fields where rushes grow.

Blubberhouses (*Lord Walsingham*); Doncaster (*W. W.*); Haigh! (*G. T. P.*); Harrogate (*J. Sang*); Richmond (*J. Sang*); Sheffield (*A. D.*).

Bactra furfurana *Haw.* Not common.

Scarborough (*T. W.*).

Phoxopteryx unguicana *L.* Hexthorpe near Doncaster (*W. W.*); Huddersfield (*P. I.*); Scarborough (*T. W.*).

Phoxopteryx biarcuana *Steph.* Sandburn near York (*W. P.*).

Phoxopteryx subarcuana *Wilk.* = **inornatana** *H. S.* Sandburn near York (*W. P.*).

Phoxopteryx myrtillana *Tr.* I found this species in profusion among bilberry in a wood near Huddersfield, on June 9th, 1883.

Blubberhouses (*Lord Walsingham*); Huddersfield !! (*G. T. P.*); Richmond (*J. Sang*); Scarborough (*T. W.*); Sheffield (*A. D.*).

Phoxopteryx lundana *Fab.* Bramham! (*J. Sm.*); Harrogate (*J. Sang*); Hexthorpe near Doncaster (*W. W.*); Huddersfield (*P. I.*); Richmond (*J. Sang*); Sheffield (*A. D.*); York (*R. C.*).

Phoxopteryx Mitterbacheriana *W. V.* Larvæ feed on oak.

Boroughbridge (*W. P.*); Bramham! (*J. Sm.*); Doncaster (*W. W.*); Harrogate (*J. Sang*); Huddersfield (*P. I.*).

Phoxopteryx harpana *Hüb.*=**ramana** *L.*=**lactana** *Fab.* Not uncommon among poplars.

Bramham! (*J. Sm.*); Doncaster (*G. T. P.*); Harrogate (*J. Sang*); Scarborough! (*T. W.*); Sheffield (*A. D.*); York (*W. P.*).

Grapholita ramana *L.* = **Paykulliana** *Fab.* Not uncommon among birches.

Doncaster (*W. W.*); Edlington Wood (*G. T. P.*); Huddersfield (*P. I.*); Richmond (*J. Sang*); York (*T. Wilson*).

Grapholita nisana *L.* Bramham (*J. Sm.*); Harrogate (*J. Sang*); Huddersfield (*P. I.*); Richmond (*J. Sang*); Thorne (*W. W.*); York (*R. C.*).

Grapholita nigromaculana *Haw.* Among ragwort.

Goole (*W. P.*); Redcar (*J. Sang*); Scarborough (*T. W.*).

Grapholita Campoliliana *W. V.* = **subocellana** *Don.* Among sallows.

Bramham ! (*J. Sm.*); Doncaster (*W. W.*); Harrogate (*J. Sang*); Huddersfield (*P. I.*); Richmond (*J. Sang*).

Grapholita trimaculana *Don.* Common among elm.

Doncaster (*W. W.*); Harrogate (*J. Sang*); Huddersfield (*P. I.*); Richmond (*J. Sang*).

Grapholita Penkleriana *W. V.* Common.

Bramham ! (*J. Sm.*); Doncaster (*W. W.*); Harrogate (*J. Sang*); Huddersfield (*P. I.*); Richmond (*J. Sang*); Scarborough ! (*T. W.*); Sheffield (*A. D.*); York (*R. C.*).

Grapholita obtusana *Haw.* Among hazel, &c.

Bishop's Wood !! (*W. P.*); Bramham ! (*J. Sm.*); Sheffield (*A. D.*).

Grapholita nævana *Hüb.* Larvæ in the young shoots of holly.

Doncaster (*W. W.*); Harrogate (*J. Sang*); Huddersfield (*P. I.*); Richmond (*J. Sang*); Sheffield (*A. D.*).

Grapholita geminana *Steph.* Richmond (*J. Sang*); Sheffield (*A. D.* and *W. W.*).

Phlæodes tetraquetrana *Haw.* Among birch, alder, &c. Common.

Doncaster (*W. W.*); Harrogate (*J. Sang*); Huddersfield (*P.I.*); Richmond (*J. Sang*).

Phlæodes immundana *Fisch.* Huddersfield (*P.I.*); Scarborough (*T. W.*).

Phlæodes crenana *Hüb.* Common at Scarborough (*T. W.*).

Hypermecia cruciana *L.* = **augustana** *D.L.* Larvæ in sallow shoots.

Bramham (*J. Sm.*); Doncaster (*W. W.*); Harrogate (*J. Sang*); Richmond (*J. Sang*); Sheffield (*A.D.*); York!! (*W.P.*).

Batodes angustiorana *Haw.* Common.

Bishop's Wood, about oaks (*W.P.*); Bramham ! (*J.Sm.*); Doncaster (*W. W.*); Richmond (*J. Sang*); York (*R.C.*).

Pœdisca bilunana *Haw.* Rather common among birches.

Bramham ! (*J.Sm.*); Doncaster (*W. W.*); Edlington Wood ! (*G.T.P.*); Harrogate (*J. Sang*); Scarborough (*T. W.*); Sheffield (*A.D.*); York (*W.P.*).

Pœdisca corticana *W.V.* Abundant among oaks.

Bramham (*J.Sm.*); Doncaster (*W. W.*); Harrogate (*J. Sang*); Huddersfield (*P.I.*); Richmond (*J. Sang*); Sheffield (*A.D.*); York (*R.C.*).

Pœdisca profundana *W.V.* Greetland Moors near Halifax (*Hobkirk's History of Huddersfield*); "bred from dwarf sallows at York by Mr. Jackson" (*W.P.*).

Pœdisca ophthalmicana *Hüb.* Not uncommon among poplars.

Bishop's Wood (*W.P.*); Bramham ! (*J.Sm.*); Redcar (*J. Sang*); Scarborough ! (*T. W.*); York (*P. W.*).

Pœdisca occultana *Dougl.* Among fir trees.

Blubberhouses !! (*Lord Walsingham*); Bramham ! (*J. Sm.*); Doncaster (*W. W.*); Harrogate (*J. Sang*); Huddersfield (*P.I.*); Richmond (*J. Sang*); Scarborough! (*T. W.*).

Pœdisca solandriana *L.* A most variable species, abundant in woods everywhere.

Pœdisca semifuscana *Haw.* Abundant on *Myrica gale* at Askham Bog (*W.P.*); Doncaster (*W. W.*); Richmond (*J. Sang*).

Pœdisca sordidana *Hüb.* = **stabilana** *Steph.* Bishop's Wood (*W.P.*); "by beating alders at York in September" (*W.P.*); and I think I have taken it at Edlington Wood (*G.T.P.*).

Ephippiphora bimaculana *Don.* Common among birches, especially in woods having an undergrowth of heather. In such a wood at Huddersfield, in September, 1882, I found the species in profusion; in one part of the wood every tap at the birch trees brought them out, and they were to be seen seated on the tops of the heather in all directions. The larva feeds in the shoots of birch in spring.

Bramham ! (*J. Sm.*); Haigh ! (*G.T.P.*); Harrogate (*J. Sang*); Huddersfield!! (*G.T.P.*); Richmond (*J. Sang*); Saltaire (*W.P.*); York (*W.P.*).

Ephippiphora cirsiana *Zell.* Bramham (*J. Sm.*); Doncaster (*W. W.*); Huddersfield (*G.C.B.M.*); Redcar (*J. Sang*); Sheffield (*A.D.*); York (*R.C.*).

Ephippiphora pflugiana *Haw.*=**scutulana** *W.V.* Larvæ in thistle stems.

Doncaster (*W. W.*); Flamborough Head (*E.H.*); Huddersfield (*G.T.P.*); Richmond (*J. Sang*); Sheffield (*A.D.*); York (*R.C.*).

Ephippiphora Brunnichiana *W.V.* Larva feeds in the flower stems of coltsfoot (*Tussilago farfara*).

Bramham ! (*J.Sm.*); Hexthorpe near Doncaster (*W.W.*); Redcar (*J. Sang*); Richmond (*J. Sang*); Sheffield (*A.D.*).

Ephippiphora turbidana *Tr.* "On the banks of the river Don between Sheffield and Rotherham" (*A.D.*).

Ephipphiphora nigricostana *Haw.* Larva in roots of *Stachys sylvatica*.

Near Doncaster ! (*W.W.*); Hexthorpe (*W.W.*); Huddersfield (*P.I.*); Sheffield (*A.D.*).

Ephippiphora trigeminana *Steph.* Bramham ! (*J.Sm.*); Doncaster (*W.W.*); Redcar (*J. Sang*).

Ephippiphora ephippana *Hüb.*=**populana** *Fab.* Larva in shoots of sallow.

Scarborough (*T.W.*).

Ephippiphora ravulana *H.S.* Mr. W. Warren found three specimens basking in the sun on birch leaves in the Green Farm Wood adjoining Sandal Beat near Doncaster.

Olindia ulmana *Hüb.* Bramham ! (*J.Sm.*); Edlington Wood (*G.T.P.* and *T. Wilson*); Harrogate (*J. Sang*).

Semasia spiniana *Fisch.* Flies in the afternoon sunshine.

Scarborough (*T.W.*).

Semasia rufillana *Zell.* Feeds on wild carrot (*Daucus carota*).

Redcar (*J. Sang*).

Semasia Wœberana *Schiff.* On fruit trees, &c.

Huddersfield (*P.I.*); Sheffield (*A.D.*); York (*R.C.*).

Coccyx strobilana *L.* Feeds in spruce fir cones, which should be gathered in winter.

Huddersfield (*P.I.*); Scarborough (*T.W.*).

Coccyx splendidulana *Gn.* About oaks, &c.
Doncaster (*W. W.*); Huddersfield (*P.I.*); Scarborough (*T. W.*); Sheffield (*A.D.*).

Coccyx argyrana *Hüb.* Also among oaks.
Doncaster (*W. W.*); Huddersfield (*P.I.*); Richmond (*J. Sang*); Scarborough (*T. W.*); Sheffield (*A.D.*).

Coccyx hyrciniana *Uslar.* Larva feeds on spruce fir.
Blubberhouses (*Lord Walsingham*); Doncaster (*W. W.*); Richmond (*J. Sang*); Sheffield (*A.D.*); Tadcaster (*J. H. Wood, Ent. Mo. Mag.*, xv. 109); York (*W.P.*).

Coccyx distinctana *Bent.* A scarce species.
Bramham ! (*J.Sm.*); Tadcaster, among *Abies picea* (*J. H. Wood, Ent. Mo. Mag.*, xv. 109).

Coccyx ustomaculana *Curt.* The larva feeds on *Vaccinium vitis-idæa.*
Huddersfield (*P.I.*); Sheffield (*A.D.*).

Coccyx vacciniana *Fisch.* Huddersfield (*P.I.*); Harrogate (*J. Sang*); Scarborough, abundant among bilberry on the moors (*T. W.*).

Heusimene fimbriana *Steph.* Larva on oak.
Bramham ! (*J.Sm.*); Huddersfield (*P.I.*); Richmond (*J. Sang*); Sheffield (*A.D.*); York (*R.C.*).

Pamplusia monticolana *Mann.* Scarborough (*T. W.*).

Retinia buoliana *W.V.* "By beating fir at Sandburn, York" (*W.P.*).

Retinia pinicolana *Dbl.* Bramham ! (*J.Sm.*); "beaten from fir at Sandburn, York" (*W.P.*).

Retinia pinivorana *Zell.* Scarborough, among firs (*T. W.*); "beaten from fir at Sandburn, York" (*W.P.*).

Retinia resinana *L.* Huddersfield (*P.I.*).

Carpocapsa grossana *Haw.* Scarborough (*T. W.*).

Carpocapsa pomonana *L.* The larva feeds in apples.
Huddersfield (*P.I.*); Scarborough (*T. W.*); Sheffield (*A.D.*); York (*R.C.*).

Opadia funebrana *Tr.* Larvæ feed inside plums.
Scarborough (*T. W.*).

Endopisa nigricana *Fab.*=**nebritana** *Tr.*=**pisana** *Gn.* Larvæ feed inside pea-pods.
Bramham ! (*J.Sm.*); Scarborough ! (*T. W.*).

Stigmonota dorsana *Fab.* = **lunulana** *W.V.* The larvæ feed in pods of *Orobus tuberosus*.
Scarborough (*T. W.*, *Ent. Mo. Mag.*, xiii. 159).

Stigmonota orobana *Tr.* This species was first discovered in England by Mr. T. Wilkinson, who bred it from larvæ in the pods of *Vicia sylvatica* collected on the cliffs to the north of Scarborough. Some were sent to Mr. Doubleday as *S. lunulana*, but he at once saw they were distinct (*Ent. Mo. Mag.* x. 148, and xiii. 158).

Stigmonota coniferana *Ratzb.* Among firs.
Harrogate (*J. Sang*); Richmond (*J. Sang*); Scarborough (*T. W.*).

Stigmonota perlepidana *Haw.* Larva feeds on *Orobus tuberosus*).
Bramham ! (*J.Sm.*); Richmond (*J. Sang*).

Stigmonota internana *Gn.* Huddersfield (*P.I.*); Richmond (*J. Sang*); Scarborough, common among whin (*T. W.*); Strensall Common, in June (*W.P.*).

Stigmonota composana *Fab.* Among clover.
Doncaster (*W. W.*); York (*R.C.*).

Stigmonota Weirana *Dougl.* = **flexana** *Zell.* Mr. W. Warren used to take this species in the Green Farm Wood adjoining Sandal Beat, Doncaster.

Stigmonota nitidana *Fab.*=**redimitana** *Gn.* The larvæ feed between united oak leaves.

Doncaster (*W. W.*).

Stigmonota Trauniana *Schiff.* Should be looked for among maple.

Huddersfield (*P.I.*); Scarborough (*T. W.*).

Stigmonota regiana *Zell.* Bramham ! (*J.Sm.*); Scarborough !!, the larva feeds under the loose bark of sycamore (*T. W.*); Sheffield (*A.D.*).

Stigmonota puncticostana *Steph.* Scarborough (*T. W.*).

Stigmonota roseticolana *Zell.*=**Germarana** *Hüb.* Among wild rose, the larva feeding in the hips.

Doncaster (*W. W.*); Scarborough (*T. W.*).

Dicrorampha politana *W. V.* Among yarrow.

Huddersfield (*P.I.*); Sheffield !! (*A.D.* and *W. W.*).

Dicrorampha alpinana *Tr.* Larva feeds on tansy (*Tanacetum vulgare*).

Hexthorpe near Doncaster ! (*W. W.*).

Dicrorampha petiverana *L.* Among yarrow (*Achillea millefolium*).

Bramham ! (*J.Sm.*); Hexthorpe near Doncaster !! (*W. W.*); Sheffield (*A.D.*).

Dicrorampha plumbana *Scop.*=**ulicana** *Gn.* About the ox-eye daisy.

Blubberhouses (*Lord Walsingham*); Bramham ! (*J.Sm.*); Richmond ! (*J. Sang*).

Dicrorampha herbosana *Barrett.* This comparatively recent addition to the British list Mr. W. Warren bred from larvæ found abundantly at roots of yarrow at Hexthorpe near Doncaster.

Dicrorampha consortana *Steph.* The larva feeds in the shoots of the ox-eye daisy.

Scarborough (*T. W.*).

Pyrodes rhediana *L.* Among hawthorn.

Hexthorpe near Doncaster (*W. W.*); Richmond (*J. Sang*).

Catoptria albersana *Hüb.* Scarborough, on honeysuckle (*T. W.*).

Catoptria ulicetana *Haw.* Common, probably everywhere, about furze, &c.

Bramham ! (*J.Sm.*); Doncaster !! (*W. W.*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Sheffield (*A.D.*).

Catoptria juliana *Curt.* The larvæ feed in acorns.

Sheffield (*A.D.*).

Catoptria hypericana *Hüb.* Probably common wherever the food-plant (*Hypericum*) grows freely.

Bramham ! (*J.Sm.*); Doncaster !! (*W. W.*); Edlington Wood ! (*G.T.P.*); Richmond ! (*J. Sang*); Sheffield (*A.D.*).

Catoptria cana *Haw.*=**scopoliana** *Wilk.* Among thistles. Some confusion exists in collections as to the nomenclature of this and the next species, consequently I only give those localities which seem certain: of part of those I have had sent it is doubtful to which species the localities belong.

Doncaster (*W. W.*); Huddersfield (*P.I.*); Redcar ! (*J. Sang*); Richmond ! (*J. Sang*).

Catoptria scopoliana *Haw.* = **Hohenwarthiana** *Gn.* Common; the larva feeds in the seed heads of *Centaurea nigra*.

Bramham ! (*J.Sm.*); Doncaster (*W. W.*); Huddersfield ! (*G.T.P.*); Sheffield (*A.D.*); York (*T. Wilson*).

Catoptria expallidana *Haw.* I took this species in my own garden at Highroyd, Huddersfield, but I know no other record for the county. Its food plant, *Sonchus arvensis*, grew freely in the adjoining fields.

Catoptria pupillana *L.* Abundant about wormwood (*Artemisia absynthium*) at Scarborough (*T. W.*).

Trycheris mediana *W. V.*=**aurana** *Fab.* Flies in the hot sunshine.

Bramham ! (*J. Sm.*); Doncaster (*W. W.*); Flamborough Head (*E. H.*); Harrogate (*J. Sang*); Huddersfield (*P. I.*); Scarborough (*T. W.*); Sheffield (*A. D.*); York (*R. C.*).

Choreutes scintilulana *Hüb.* Abundant among *Scutellaria galericulata* at Scarborough (*T. W.*).

Xylopoda fabriciana *L.* Generally common among nettles.

Bramham ! (*J. Sm.*); Grassington (*G. T. P.*); Mickley near Ripon (*G. T. P.*); Redcar !! (*J. Sang*); Richmond !! (*J. Sang*); Sheffield (*A. D.*).

Eupœcilia nana *Haw.* Common.

Doncaster !! (*W. W.*); Huddersfield ! (*G. T. P.*); Richmond (*J. Sang*); Sheffield (*A. D.*).

Eupœcilia atricapitana *Steph.* Larva feeds in stems of ragwort.

Doncaster (*W. W.*); Flamborough Head (*E. H.*); Huddersfield (*P. I.*); Scarborough (*T. W.*).

Eupœcilia maculosana *Haw.* Flies in the morning sunshine.

Bramham ! (*J. Sm.*); Doncaster (*W. W.*); Huddersfield (*P. I.*); Richmond (*J. Sang*).

Eupœcilia sodaliana *Haw.* On *Hieracium* at Scarborough (*T. W.*).

Eupœcilia hybridellana *Hüb.*=**carduana** *Zell.* Bred by Mr. T. Wilkinson of Scarborough from seed-heads of *Picris hieracioides* (*Ent. Mo. Mag.*, xv. 141).

Eupœcilia angustana *Hüb.* Generally common on heaths.

Doncaster (*W. W.*); Flamborough Head (*E. H.*); Huddersfield (*G. T. P.*); Richmond !! (*J. Sang*); Scar-

borough (*W. R. Jeffrey, Ent. Mo. Mag.*, xv. 142); Thorne Waste ! (*G. T. P.*); York, abundant at Strensall Common (*W. P.*).

Eupœcilia ciliana *Hüb.* = **ruficiliana** *Haw.* Larva feeds in the seed-heads of various species of *Primula*.

Huddersfield (*P. I.*); Richmond (*J. Sang*).

Xanthosetia zoegana *L.* Generally distributed.

Bramham ! (*J. Sm.*); Doncaster (*W. W.*); Flamborough Head (*E. H.*); Huddersfield (*P. I.*); Redcar (*J. Sang*); Richmond (*J. Sang*); Sheffield (*A. D.*); York (*W. P.*).

Xanthosetia hamana *L.* Bramham ! (*J. Sm.*); Doncaster (*W. W.*); Flamborough Head (*E. H.*); Huddersfield (*Hobkirk's History of Huddersfield*); Redcar ! (*J. Sang*); Richmond ! (*J. Sang*); Sheffield (*A. D.*); York (*W. P.*).

Chrosis tesserana *W. V.* Scarborough !! (*T. W.*).

Argyrolepia Baumanniana *W. V.*=**Hartmanniana** *Clerk.* Bramham ! (*J. Sm.*); Huddersfield (*P. I.*); Sheffield (*A. D.*).

Argyrolepia subbaumanniana *Wilk.* Richmond (*J. Sang*).

Argyrolepia badiana *Hüb.* Larva feeds in the roots of *Arctium lappa*.

Bramham (*J. Sm.*); Scarborough (*T. W.*).

Argyrolepia cnicana *Dbl.* Among thistles.

Bishop's Wood ! (*W. P.*); Bramham ! (*J. Sm.*); Flamborough Head (*E. H.*); Huddersfield (*P. I.*); Scarborough (*T. W.*); Sheffield (*A. D.*); York (*Ent. W. Int.*, 1860, *p.* 134).

Conchylis dilucidana *Steph.* The larva feeds in the stems of the wild parsnip (*Pastinaca sativa*).

Doncaster (*W. W.*).

Conchylis Smeathmanniana *Fab.* Larva feeds in the heads of *Achillea millefolium*, *Centaurea nigra*, &c.

Blubberhouses (*Lord Walsingham*); Doncaster (*W. W.*); Redcar (*J. Sang*).

Conchylis stramineana *Haw.* Common. The larva feeds in the heads of *Centaurea nigra.*

Bramham (*J.Sm.*); Flamborough Head (*E.H.*); Huddersfield (*G.T.P.*); Richmond! (*J. Sang*); Sheffield (*A.D.*); York (*W.P.*).

Conchylis gigantana *Gn.*=**alternana** *Steph.* Larva feeds in heads of *Centaurea scabiosa.*

Huddersfield (*P.I.*).

Conchylis inopiana *Haw.* Occurs among fleabane (*Inula dysenterica*).

Scarborough ! (*T. W.*).

Aphelia pratana *Hüb.* = **osseana** *Scop.* Common; frequenting grassy parts of heaths and moors, grassy slopes, &c.

Bramham (*J.Sm.*); Grassington !! (*G.T.P.*); Huddersfield! (*G.T.P.*); Richmond !! (*J. Sang*); Saddleworth Moors (*R. S. Edelston*); Sandburn near York (*W.P.*).

Tortricodes hyemana *Hüb.* Common.

Bramham ! (*J.Sm.*); Doncaster!! (*W. W.*); Huddersfield (*P.I.*); Richmond!(*J. Sang*); Sheffield (*A.D.*); York (*T. Wilson*).

TINEÆ.

Lemnatophila phryganella *Hüb.* Bramham (*J.Sm.*); Huddersfield (*P.I.*); Scarborough!! (*Stainton's Manual*); Sheffield (*A.D.*); York (*T. Wilson*).

Lemnatophila salicella *Hüb.* Huddersfield (*Hobkirk's History of Huddersfield*); York (*T. Wilson*).

Exapate gelatella *L.* Huddersfield, in my own garden (*G.T.P.*); Richmond (*J. Sang*); Sheffield (*A.D.*); York! (*T. Wilson*).

Diurnea fagella *W.V.* Abundant everywhere and very variable, some being very pale grey, others nearly black.

Epigraphia avellanella *Hüb.* Doncaster (*W.W.*); Huddersfield (*Hobkirk's History of Huddersfield*); Scarborough (*Stainton's Manual*); Sheffield (*A.D.*); York (*T. Wilson*).

Epigraphia Steinkellneriella *W.V.* Doncaster (*W.W.*); Huddersfield (*P.I.*); Scarborough, abundant on hawthorn and mountain-ash (*T.W.*); Sheffield (*A.D.*); York (*Stainton's Manual*).

Talæporia pubicornella *Haw.?* Grassington (*T.H.A.*, *Stainton's Manual*, and *Young Naturalist*, *August*, 1882).

Talæporia pseudo-bombycella *Och.* Doncaster!! (*W.W.*); Scarborough, abundant on sycamore trunks (*T.W.*); York (*Stainton's Manual*).

Psyche roboricolella *Br.* Gledhow (*J.W.T.*); Huddersfield (*Hobkirk's History of Huddersfield*); Sheffield (*A.D.*); York (*Ent. W. Int.*, 1860, *p.* 134).

Solenobia inconspicuella *Stn.* Huddersfield (*Hobkirk's History of Huddersfield*); York (*Stainton's Manual*).

Psychoides Verhuellella *Heyd.* Richmond (*Stainton's Manual*); "Mr. Braim met with the larvæ mining the leaves of *Scolopendrium vulgare* last December" (*Ent. Ann.*, 1858, *p.* 104). "Unknown there to me" (*J. Sang*).

Diplodoma marginepunctella *Steph.* Huddersfield (*P.I.*); York (*Stainton's Manual*).

Xysmatodoma melanella *Haw.* York (*Stainton's Manual*).

Ochsenheimeria Birdella *Curt.* Huddersfield (*P.I.*); Scarborough! (*Stainton's Manual*); York (*Stainton's Manual*).

Ochsenheimeria bisontella *Lienig.* Huddersfield (*P.I.*).

Scardia emortuella *Zell.*=corticella *Curt.* Huddersfield (*P.I.*); Sheffield (*A.D.*); York (*Stainton's Manual*).

Scardia granella *L.* Doncaster !! (*W.W.*); Scarborough !! (*Stainton's Manual*); York !! (*Stainton's Manual*).

Scardia cloacella *Haw.* Common probably everywhere.
Doncaster !! (*W.W.*); Huddersfield (*P.I.*); Redcar !! (*J. Sang*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York !! (*T. Wilson*).

Scardia arcella *Fab.* Edlington Wood (*W.W.*); Scarborough ! (*T.W.*).

Tinea imella *Hüb.* Not common.
Stockton (*Zool.*, 1856, xiv. 5003).

Tinea rusticella *Hüb.* Common probably everywhere.
Doncaster (*W.W.*); Huddersfield (*G.T.P.*); Redcar !! (*J. Sang*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*).

Tinea fulvimitrella *Sodoff.* Widely distributed, but not common.
Bingley, one at Hawksworth Wood in June, 1882 (*E.P.P.B.*); Bramham (*J.Sm.*); Doncaster (*W.W.*); Rotherham (*Stainton's Manual*); Scarborough (*T.W.*); Sheffield (*A.D.*); York, in 1882 (*T. Wilson*).

Tinea tapetzella *L.* Very common everywhere.

Tinea misella *Zell.* York ! (*Stainton's Manual*).

Tinea pellionella *L.* In warehouses, &c., probably everywhere.
Doncaster (*W.W.*); Huddersfield ! (*G.T.P.*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York ! (*Stainton's Manual*).

Tinea fuscipunctella *Haw.* Common.

Huddersfield (*G.T.P.*); Scarborough !! (*Stainton's Manual*); York (*R. Anderson*).

Tinea pallescentella *Stn.* Common in warehouses, &c.

Doncaster (*W.W.*); Huddersfield !! (*G.T.P.*); Leeds (*E.B.*); York (*Stainton's Manual*).

Tinea ganomella *Tr.*=**lapella** *Stn.* Common.

Bramham (*J.Sm.*); Huddersfield (*P.I.*); Redcar (*J. Sang*); Richmond (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*H. T. Stainton, Zool.*, 1849, *p.* 2630); Thorne (*W.W.*); York (*Stainton's Manual*).

Tinea biselliella *Hemm.* Abundant in warehouses, the larvæ feeding on wool, hair, feathers, &c.

Doncaster !! (*W.W.*); Huddersfield !! (*G.T.P.*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York ! (*Stainton's Manual*).

Tinea nigripunctella *Haw.* Edlington Wood (*W.W.*); York (*Stainton's Manual*).

Tinea semifulvella *Haw.* Bishop's Wood (*W.P.*); Edlington Wood (*W.P.*); Flamborough Head (*E.H.*); Richmond (*J. Sang*); Scarborough (*T.W.*); Thorne (*W.W.*); York (*Stainton's Manual*).

Tinea bistrigella *Haw.* Among birch, in the leaves of which the larva feeds.

Doncaster (*W.W.*); Harrogate ! (*J. Sang*); Huddersfield (*P.I.*); Richmond ! (*J. Sang*); Scarborough !! (*T.W.*); York (*R.C.*).

Lampronia quadripunctella *Fab.* Thorne !! (*W.W.*); York (*Stainton's Manual*).

Lampronia luzella *Hüb.* Bramham (*J.Sm.*); Huddersfield (*Hobkirk's History of Huddersfield*); Richmond (*J. Sang*); Scarborough (*T.W.*); York (*Stainton's Manual*).

Lampronia prælatella *W.V.* Edlington Wood !! (*W.W.*); Huddersfield (*Hobkirk's History of Huddersfield*); Richmond (*J. Sang*); Scarborough (*T.W.*).

Lampronia rubiella *Bjerk.* Doncaster! (*W.W.*); Huddersfield (*Hobkirk's History of Huddersfield*); Richmond! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York (*Stainton's Manual*).

Incurvaria masculella *W.V.* Generally common. Bramham (*J.Sm.*); Doncaster!! (*W.W.*); Harrogate! (*J. Sang*); Huddersfield (*P.I.*); Richmond! (*J. Sang*); Scarborough !! (*Stainton's Manual*); York (*W.P.*).

Incurvaria Zinckenella *Zell.* Halifax (*H. T. Stainton, Zool.*, 1848, *p.* 2631); Huddersfield ! (*G.T.P.*); Scarborough (*R.C.*); Thorne (*W.W.*); York ! (*Stainton's Manual*).

Incurvaria tenuicornella *Stn.* Wharncliffe (*C. S. Gregson, Ent. W. Int., April* 26, 1856).

Incurvaria Œhlmanniella *Hüb.* Richmond (*J. Sang*); Scarborough (*T.W.*); York (*Stainton's Manual*).

Incurvaria capitella *L.* Huddersfield (*P.I.*); Scarborough (*Stainton's Manual*).

Micropteryx calthella *L.* Doncaster !! (*W.W.*); Huddersfield (*P.I.*); Mickley near Ripon !! about buttercup flowers (*G.T.P.*); Richmond !! (*J. Sang*); Scarborough, about flowers of marsh marigold (*T.W.*); York ! (*Stainton's Manual*).

Micropteryx Seppella *Fab.* Doncaster !! (*W.W.*); Flamborough Head (*E.H.*); Huddersfield (*G.T.P.*); Scarborough! (*Stainton's Manual*); York! (*Stainton's Manual*).

Micropteryx mansuetella *Zell.* York (*Stainton's Manual*).

Micropteryx Allionella *Fab.* Huddersfield ! (*G.T.P.*); Richmond !! (*J. Sang*); Scarborough, about spike-heads of wood sedge, *Carex sylvatica* (*T.W.*); York ! (*Stainton's Manual*).

Micropteryx Thunbergella *Fab.* Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sedbergh (*W.W.*); York, in 1877 (*W.P.*).

Micropteryx purpurella *Steph.* Bramham (*J.Sm.*); Huddersfield (*P.I.*); Scarborough ! (*Stainton's Manual*); Sheffield (*A.D.*); York ! (*W.P.*).

Micropteryx salopiella *Stn.* Bramham (*J.Sm.*); Doncaster (*W.W.*); Scarborough, on birch (*T.W.*).

Micropteryx semipurpurella *Steph.* Bramham (*J.Sm.*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York ! (*W.P.*)

Micropteryx unimaculella *Zett.* Richmond ! (*J. Sang*); Scarborough (*T.W.*, *Ent. Ann.*, 1862, *p.* 123); York ! (*Stainton's Manual*).

Micropteryx Sparmanella *Bosc.* Richmond ! (*J. Sang*); Scarborough, among birch (*T.W.*); York (*Stainton's Manual*).

Micropteryx subpurpurella *Haw.* Castle Howard (*W.P.*); Doncaster !! (*W.W.*); Huddersfield (*P.I.*); Richmond ! (*J. Sang*); Scarborough (*T.W.*, *Ent. Ann.*, 1863, *p.* 154); York (*W.P.*).

Micropteryx fastuosella *Zell.* The larva feeds in hazel leaves.

Larvæ at Richmond (*J. Sang*); imago at York (*J. Sang*).

Nemophora Swammerdamella *L.* Doncaster ! (*W.W.*); Huddersfield (*G.T.P.*); Richmond ! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York ! (*Stainton's Manual*).

Nemophora Schwarziella *Zell.* Doncaster ! (*W. W.*); Huddersfield !! (*G.T.P.*); Richmond !! (*J. Sang*); Scarborough (*T. W.*); York ! (*Stainton's Manual*).

Nemophora pilella *W. V.* Recorded from Scarborough and York, but Mr. Sang thinks it very doubtful if it occurs in Yorkshire, and that the supposed specimens were merely dark examples of *N. Schwarziella*.

Nemophora metaxella *Hüb.* Occurs on marshy ground. Askham Bog ! (*W.P.*); Bramham (*J.Sm.*); Scarborough (*Stainton's Manual*); York (*T. Wilson*).

Adela fibulella *W. V.* Feeds on speedwell (*Veronica chamædrys*).
Doncaster (*W. W.*); Richmond (*J. Sang*); Scarborough (*T. W.*); York ! (*Stainton's Manual*).

Adela rufimitrella *Scop. ?* Richmond (*J. Sang*); Scarborough (*T. W.*); York (*Stainton's Manual*).

Adela sulzella *W. V.* Scarborough (*T. W.*); York (*W.P.*).

Adela Degeerella *L.* Doncaster !! (*W. W.*); Huddersfield (*Hobkirk's History of Huddersfield*); Sheffield (*A.D.*); York (*J. Birks*).

Adela viridella *L.* Bramham (*J.Sm.*); Doncaster !! (*W. W.*); Huddersfield !! (*G.T.P.*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York !! (*Stainton's Manual*).

Nemotois cupriacella *Hüb.* Scarborough, about scabious (*T. W.*).

Nemotois minimella *Zell.* York (*T. Wilson, Ent. Mo. Mag.*, xvi. 211).

Swammerdamia comptella *Hüb.*=**apicella** *Don. ?* Redcar (*J. Sang*); Richmond (*J. Sang*); Scarborough !! (*Stainton's Manual*); York ! (*T. Wilson*).

Swammerdamia cæsiella *Hüb.* Doncaster !! (*W. W.*); Huddersfield (*P.I.*); Scarborough (*Stainton's Manual*); York (*T. Wilson*).

Swammerdamia oxyacanthella *Stn.?* Doncaster !! (*W. W.*).

Swammerdamia griseocapitella *Stn.* Harrogate (*J. Sang*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); York ! (*Stainton's Manual*).

Swammerdamia lutarella *Haw.* Richmond (*J. Sang*); Scarborough (*Stainton's Manual*); York (*Stainton's Manual*).

Swammerdamia pyrella *Vill.* Doncaster (*W. W.*); Harrogate !! (*J. Sang*); Huddersfield (*P.I.*); Redcar !! (*J. Sang*); Richmond ! (*J. Sang*); Scarborough (*Stainton's Manual*); York (*T. Wilson*).

Yponomeuta plumbella *W.V.* Larva feeds on spindle. Edlington Wood, common some seasons (*G.T.P.*, *W.P.*, and *W.W.*); Richmond (*Stainton's Manual*).

Yponomeuta padella *L.* Bramham (*J.Sm.*); Doncaster (*W. W.*); Huddersfield (*P.I.*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York ! (*T. Wilson*).

Yponomeuta cognatella *Hüb.* Huddersfield (*P.I.*); Scarborough !! (*Stainton's Manual*); York ! (*Stainton's Manual*).

Yponomeuta evonymella *L.*=**padi** *Zell.* Blubberhouses (*Lord Walsingham*); Bramham (*J.Sm.*); Doncaster (*W. W.*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Sheffield (*A.D.*); York ! (*Stainton's Manual*).

Anesychia funerella *Fab.* Mr. J. Sang informs me that this local and beautiful species occurs at Richmond, and on the Yorkshire side of Barnard Castle.

Pepilla Curtisella *Don.* Bramham (*J.Sm.*); Doncaster ! (*W.W.*); Flamborough Head (*E.H.*); Harrogate !! (*J. Sang*); Huddersfield (*P.I.*); Redcar !! (*J. Sang*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York ! (*Stainton's Manual*).

Plutella xylostella *L.* = **cruciferella** *Zell.* Common among cruciferous plants.

Bramham (*J.Sm.*); Doncaster ! (*W.W.*); Flamborough Head (*E.H.*); Harrogate (*J. Sang*); Huddersfield (*P.I.*); Redcar !! (*J. Sang*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York !! (*Stainton's Manual*).

Plutella porrectella *L.* Scarborough (*Stainton's Manual*); York ! (*Stainton's Manual*).

Plutella annulatella *Curt.* Flamborough Head (*E.H.*); Scarborough (*T.W.*).

Plutella Dalella *Stn.* Huddersfield (*P.I.*); Richmond (*J. Sang*); Scarborough (*T.W.*).

Hypolepia sequella *L.* Richmond (*J. Sang*); Scarborough !! (*Stainton's Manual*); York (*Stainton's Manual*).

Hypolepia vittella *L.* Generally common in woods, &c.

Edlington Wood ! (*G.T.P.*); Elland (*G.T.P.*); Hexthorpe (*W.W.*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); York (*W.P.*).

Hypolepia radiatella *Don.* Common.

Bishop's Wood (*W.P.*); Doncaster (*W.W.*); Harrogate !! (*J. Sang*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); York ! (*T. Wilson*).

Hypolepia costella *Fab.* Bishop's Wood (*W.P.*); Bramham (*J.Sm.*); Doncaster (*W.W.*); Harrogate !! (*J. Sang*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough, on sallow (*T.W.*); York (*T. Wilson*).

Ypsolopha sylvella *L.* Among oak.
Scarborough (*Stainton's Manual*); York (*Stainton's Manual*).

Ypsolopha alpella *W.V.* Among oak.
York (*Stainton's Manual*).

Ypsolopha lucella *Fab.* York (*Stainton's Manual*).

Harpipteryx scabrella *L.* Larva feeds on apple.
Bramham (*J.Sm.*); Scarborough (*Stainton's Manual*); York (*T. Wilson*).

Harpipteryx nemorella *L.* Rather common among honeysuckle.
Edlington Wood (*G.T.P.*); Huddersfield (*G.C.B.M.*); Richmond (*J. Sang*); Scarborough (*T.W.*); Sheffield (*A.D.*); York (*W.P.*).

Harpipteryx harpella *W.V.*=**xylostella** *Stn.* Common probably wherever honeysuckle grows freely.
Edlington Wood ! (*G.T.P.*); Harrogate !! (*J. Sang*); Huddersfield (*G.T.P.*); Richmond !! (*J. Sang*); Sheffield (*A.D.*); York (*W.P.*).

Orthotælia sparganiella *Thunb.* Scarborough, larvæ in stems of bur-reed, *Sparganium ramosum* (*T.W.*); York (*Stainton's Manual*).

Phibalocera quercella *Fab.* Bramham (*J.Sm.*); Harrogate !! (*J. Sang*); Richmond !! (*J. Sang*); Scarborough (*T.W.*); Sheffield (*A.D.*); York (*R.C.*).

Exæretia Allisella *Stn.* Scarborough (*T.W.*).

Depressaria costosella *Haw.* Among furze, &c.
Bramham (*J.Sm.*); Flamborough Head (*E.H.*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York (*W.P.*).

Depressaria liturella *W.V.* Bramham (*J.Sm.*); Doncaster (*W.W.*); Flamborough Head (*E.H.*); Huddersfield ! (*G.T.P.*); Redcar !! (*J. Sang*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York ! (*T. Wilson*).

Depressaria pallorella *Zell.* Scarborough (*Stainton's Manual*).

Depressaria umbellella *Steph.* Among furze.
Scarborough !! (*Stainton's Manual*); York ! (*T. Wilson*).

Depressaria assimilella *Tr.* Among broom.
Bramham (*J.Sm.*); Huddersfield (*P.I.*); Pontefract (*W.P.*); Scarborough (*Stainton's Manual*); Sheffield (*A.D.*); York !! (*Stainton's Manual*).

Depressaria nanatella *Stn.* Redcar (*J. Sang*).

Depressaria arenella *W.V.* Among knapweed and thistle.
Bramham (*J.Sm.*); Doncaster !! (*W.W.*); Redcar !! (*J. Sang*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); York !! (*T. Wilson*).

Depressaria propinquella *Tr.* Among thistles.
Redcar !! (*J. Sang*); Scarborough (*T.W.*); York (*T. Wilson*).

Depressaria subpropinquella *Stn.* Among thistles.
Doncaster (*W.W.*); Redcar !! (*J. Sang*); Scarborough ! (*Stainton's Manual*); York (*Stainton's Manual*).

Depressaria alstræmeriella *L.* Huddersfield (*P.I.*); Redcar !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York ! (*T. Wilson*).

Depressaria capreolella *Zell.* Said to feed on wild carrot.
Sheffield (*W.W.*).

Depressaria hypericella *Hüb.* Larvæ in screwed-up tops of St. John's wort (*Hypericum*).

Edlington Wood (*W. W.*); Scarborough (*T. W.*); Sheffield (*A.D.*).

Depressaria conterminella *Zell.* Among sallows.

Doncaster (*W. W.*); Richmond !! (*J. Sang*); York (*W.P.*).

Depressaria angelicella *Hüb.* Among *Angelica sylvestris.*

Huddersfield (*Hobkirk's History of Huddersfield*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York (*T. Wilson*).

Depressaria carduella *Hüb.* Among thistles.

Scarborough (*T. W.*).

Depressaria ocellella *Fab.* Among sallows.

Huddersfield (*P.I.*); Pontefract (*W.P.*); Scarborough !! (*Stainton's Manual*); York ! (*T. Wilson*).

Depressaria Yeatiella *Fab.* Larva said to feed on wild carrot.

Huddersfield (*P.I.*); Leeds (*G.C.B.M.*); York ! (*Stainton's Manual*).

Depressaria applanella *Fab.* Probably everywhere.

Bishop's Wood (*C.S.*); Doncaster (*W. W.*); Huddersfield (*P.I.*); Pontefract (*W.P.*); Redcar !! (*J. Sang*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York ! (*T. Wilson*).

Depressaria ciliella *Stn.* Among *Angelica.*

Huddersfield (*P.I.*); Redcar !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); York ! (*Stainton's Manual*).

Depressaria pimpinella *Zell.* York (*Stainton's Manual*).

Depressaria albipunctella *Hüb.* Larva feeds on wild carrot.

Scarborough (*Stainton's Manual*).

Depressaria pulcherrimella *Stn.* Huddersfield (*P.I.*); Scarborough, abundant among *Bunium flexuosum* (*T. W.*); York (*Stainton's Manual*).

Depressaria Douglasella *Stn.* Larva feeds on wild carrot. One specimen at Redcar (*J. Sang*).

Depressaria chærophyllivorella *Dbl.* Scarborough (*Stainton's Manual*).

Depressaria ultimella *Stn.* Redcar (*J. Sang*); Scarborough (*Stainton's Manual*).

Depressaria nervosella *Haw.* Scarborough (*Stainton's Manual*).

Depressaria badiella *Hüb.* Redcar ! (*J. Sang*).

Depressaria heracliella *De Geer.* Common in woods and lanes where *Heracleum sphondylium* grows freely.

Bishop's Wood (*W.P.*); Edlington Wood !! (*G.T.P.*); Flamborough Head (*E.H.*); Goole Moors (*J. Harrison*); Huddersfield ! (*G.T.P.*); Redcar !! (*J. Sang*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); York ! (*T. Wilson*).

Depressaria discipunctella *H.S.* = **pastinacella** *Dup.* Huddersfield (*Hobkirk's History of Huddersfield*); one specimen at Redcar (*J. Sang*).

Gelechia cinerella *L.* Redcar ! (*J. Sang*); Scarborough (*T. W.*); York ! (*Stainton's Manual*).

Gelechia rufescentella *Haw.* Hexthorpe (*W. W.*); Redcar ! (*J. Sang*); Scarborough "in tubulated rolled grass leaves" (*T. W.*); York (*Stainton's Manual*).

Gelechia malvella *Hüb.* Occurs in gardens about hollyhocks.

Huddersfield (*P.I.*); Scarborough (*Stainton's Manual*).

Gelechia populella *L.* Bramham (*J. Sm.*); Scarborough (*Stainton's Manual*); Sheffield (*A.D.*); York (*W.P.*).

Gelechia ericetella *Hüb.* Very common, probably on all heaths.

Harrogate (*J. Sang*); Huddersfield !! (*G.T.P.*); Richmond !! (*J. Sang*); Sheffield (*A.D.*); Thorne (*W.W.*).

Gelechia mulinella *Fisch.* Among furze.

Doncaster !! (*W.W.*); Huddersfield (*P.I.*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York ! (*Stainton's Manual*).

Gelechia sororculella *Hüb.* Among sallow.

Doncaster (*W.W.*).

Gelechia cuneatella *Zell.* Scarborough, on willow (*T.W.*); York (*Rev. J. D. J. Preston, Ent. Ann.*, 1858, *p.* 106).

Gelechia longicornella *Curt.* Huddersfield (*P.I.*); Richmond (*J. Sang*); Scarborough (*Stainton's Manual*); Sheffield (*A.D.*); Thorne (*W.W.*); York ! (*Stainton's Manual*).

Gelechia diffinella *Haw.* Huddersfield (*P.I.*); Scarborough !! the larva is found in a burrow at the root of *Rumex acetosella* (*T.W.* and *J. Sang*).

Gelechia terrella *W.V.* Common no doubt everywhere.

Blubberhouses (*Lord Walsingham*); Doncaster !! (*W.W.*); Huddersfield ! (*G.T.P.*); Redcar !! (*J. Sang*); Richmond !! (*J. Sang*).

Gelechia desertella *Stn.* Redcar !! (*J. Sang*); Scarborough ! (*Stainton's Manual*); York (*Stainton's Manual*).

Gelechia intaminatella *Stn.* Scarborough (*T.W.*).

Gelechia expolitella *Dougl.* Redcar (*J. Sang*).

Gelechia acuminatella *Sircom.* Doncaster ! (*W.W.*); Redcar ! (*J. Sang*); Scarborough, on thistle (*T.W.*).

Gelechia artemisiella *Tr.* Redcar (*J. Sang*); Scarborough !! (*Stainton's Manual*).

Gelechia viscariella *Logan.* Scarborough, about *Lychnis dioica*, common (*T. W.*).

Gelechia albipalpella *H.S.* At York in 1857 by Mr. Scott (*Ent. Ann.*, 1858, *p.* 90).

Gelechia senectella *Zell.* Redcar! (*J. Sang*); Scarborough (*Stainton's Manual*).

Gelechia mundella *Dougl.* Redcar (*J. Sang*).

Gelechia similella *Dougl.* Richmond (*J. Sang*); Scarborough (*T. W.*).

Gelechia affinella Doncaster (*W. W.*); Huddersfield (*P. I.*).

Gelechia confinella *Stn.* I have repeatedly bred this insect along with *Scoparia muralis*, from moss found on old walls at Huddersfield. It was first added to the British list, as a species new to science, in 1871, from specimens bred by Mr. C. G. Barrett from larvæ sent in moss from old walls at Perth by Dr. F. Buchanan White, *mixed with those of Scoparia muralis*, which Mr. Barrett wished to breed (*Ent. Ann.*, 1871, *p.* 98). Mr. Sang has also taken the species at Richmond.

Gelechia umbrosella *Zell.* Rossington (*W. W.*).

Gelechia domesticella *Haw.* Huddersfield (*P. I.*); Scarborough (*Stainton's Manual*); York! (*Stainton's Manual*).

Gelechia rhombella *Hüb.* Larva on apple.
Huddersfield (*P. I.*); Scarborough !! (*T. W.* and *J. Sang*); York (*T. Wilson*).

Gelechia proximella *Hüb.* Larva on birch, &c.
Doncaster! (*W. W.*); Harrogate !! (*J. Sang*); Huddersfield (*P. I.*); Richmond !! (*J. Sang*); Scarborough !! (*J. Sang*); York! (*Stainton's Manual*).

Gelechia notatella *Hüb.* Doncaster! (*W. W.*); Scarborough (*T. W.*); York (*Stainton's Manual*).

Gelechia vulgella *Hüb.* Larva feeds on hawthorn.
Doncaster (*W. W.*); Huddersfield (*P.I.*); Scarborough! (*Stainton's Manual*); York! (*Stainton's Manual*).

Gelechia luculella *Hüb.* Hexthorpe! (*W. W.*); Huddersfield (*P.I.*); Sheffield (*A.D.*); York, in 1882 (*T. Wilson*).

Gelechia scriptella *Hüb.* Sheffield (*A.D.*); York (*Stainton's Manual*).

Gelechia fugitivella *Zell.* Edlington Lane, Doncaster!! (*W. W.*); Leyburn! (*J. Sang*); Scarborough! (*Stainton's Manual*).

Gelechia Æthiopella *West.* On ling.
Huddersfield (*P.I.*); Richmond (*J. Sang*); Scarborough!! (*T. W.*); York! (*Stainton's Manual*).

Gelechia solutella *Fisch.* Scarborough (*T. W.*).

Gelechia celerella *Dougl.* Redcar (*J. Sang*).

Gelechia costella *Steph.* Bramham (*J. Sm.*).

Gelechia maculella *Haw.* Larva in seed-heads and shoots of *Stellaria holostea*.
Redcar (*J. Sang*); Scarborough (*T. W.*); York (*Stainton's Manual*).

Gelechia tricolorella *Haw.* Also among *Stellaria holostea*.
Doncaster! (*W. W.*); Redcar (*J. Sang*); Scarborough!! (*Stainton's Manual*); York (*Stainton's Manual*).

Gelechia fraternella *Dougl.* Larva in shoots of *Cerastium*.
Scarborough (*T. W.*); Sheffield (*H. T. Stainton, Ent. W. Int., April* 20, 1861).

Gelechia maculiferella *Mann.* York (*T. Wilson*).

Gelechia junctella *Dougl.* York (*Stainton's Manual*).

Gelechia Hubnerella *Haw.* Bishop's Wood (*W.P.*); Huddersfield (*P.I.*).

Gelechia marmorella *Haw.* Huddersfield (*P.I.*); Redcar !! (*J. Sang*).

Gelechia obsoletella *Fisch.* Redcar !! (*J. Sang*).

Gelechia plantaginella *Stn.* This species was for many years confounded with *G. instabilella* Dougl., but Mr. Stainton has recently (*Ent. Mo. Mag.*, xix. 251) described the *Plantago maritima* feeding form, which is the one frequenting our coast, as a distinct species under the above name.

Flamborough Head (*E.H.*); Saltburn ! (*J. Sang*); Scarborough !! (*T. W.*).

Gelechia sequacella *Haw.* Richmond !! (*J. Sang*); Scarborough (*Stainton's Manual*).

Gelechia leucatella *L.* Doncaster ! (*W. W.*); Scarborough (*Stainton's Manual*).

Gelechia albicapitella *Zell.* Hexthorpe near Doncaster (*W. W.*).

Gelechia Mouffetella *W. V.* Larva on honeysuckle.

Huddersfield (*P.I.*); Sheffield (*A.D.*); York (*Stainton's Manual*).

Gelechia dodecella *L.* Larva in shoots of Scotch fir.

Doncaster (*W. W.*); Harrogate (*J. Sang*); Scarborough (*T. W.*); York (*Stainton's Manual*).

Gelechia triparella *Zell.* York (*Stainton's Manual*).

Gelechia tenebrella *Hüb.*=tenebrosella *Zell.* Doncaster !! (*W. W.*); Huddersfield (*P.I.*); Scarborough !! (*T. W.* and *J. Sang*); York (*Stainton's Manual*).

Gelechia ligulella *Zell.* Scarborough (*T. W.*); York (*T. Wilson*).

Gelechia vorticella *Zell.* Doncaster !! (*W. W.*).

Gelechia tæniolella *Tr.* Scarborough, larva between leaves of *Lotus* (*T. W.*); York (*Stainton's Manual*).

Gelechia Sircomella *Stn.* Scarborough (*T. W.*).

Gelechia anthyllidella *Hüb.* Redcar (*J. Sang*); Scarborough !! (*Stainton's Manual*).

Gelechia lucidella *Steph.* York (*Stainton's Manual*).

Gelechia næviferella *Zell.* Among *Chenopodium.*
Doncaster (*W. W.*); Huddersfield (*P.I.*); Redcar !! (*J. Sang*).

Gelechia Hermannella *Fab.* Redcar !! (*J. Sang*); Scarborough, larva on leaves of *Chenopodium* (*T. W.*).

Gelechia osseella *Stn.* First discovered by Mr. T. Wilkinson in 1860, and described as new to science by Mr. Stainton in the Entomologists' Annual for 1861, p. 87: "Mr. Wilkinson found them freely on the wing in the hot sunshine, the first week in June, in Yedmandale and Forge Valley, near Scarborough."

Gelechia pictella *Zell.* At roots of *Cerastium vulgatum.*
Redcar (*J. Sang*); Rossington (*W. W.*).

Gelechia ericinella *Zell.* Occurs on heaths.
Doncaster (*W. W.*); Thorne Waste (*W.P.*); York (*W.P.*).

Gelechia subocellella *Steph.* Scarborough, abundant among *Origanum* (*T. W.*).

Parasia lappella *L.* Larva feeds in seeds of burdock (*Arctium*).
Bramham (*J.Sm.*); Scarborough (*T. W.*); York (*Stainton's Manual*).

Parasia Metzneriella *Dougl.* Among *Centaurea nigra.*
Harrogate !! (*J. Sang*); Hexthorpe !! (*W. W.*); Scarborough !! (*T. W.* and *J. Sang*); Sheffield (*A.D.*).

Parasia carlinella *Dougl.* Among carline thistle (*Carlina vulgaris*).
Scarborough (*T. W.*); York (*Stainton's Manual*).

Chelaria conscriptella *Hüb.*=Hubnerella *Don.* Askham Bog ! (*W.P.*); Bramham (*J.Sm.*); Doncaster ! (*W. W.*); Harrogate !! (*J. Sang*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); York (*T. Wilson*).

Anarsia spartiella *Schr.* Among furze, &c., Scarborough (*T. W.*).

Macrochila marginella *Fab.* Huddersfield (*P.I.*).

Sophronia parenthesella *L.* Rossington (*W. W.*).

Pleurota bicostella *L.* Plentiful in suitable localities. Halifax ! (*G.T.P.*); Huddersfield !! (*G.T.P.*); Richmond !! (*J. Sang*); Scarborough !! (*T. W.* and *J. Sang*); Sheffield (*A.D.*); Thorne Waste (*G.T.P.* and *W. W.*); York (*W.P.*).

Harpella Geoffrella *L.* Huddersfield (*P.I.*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*).

Dasycera sulphurella *Fab.* Common. Bramham (*J.Sm.*); Doncaster !! (*W. W.*); Huddersfield (*G.T.P.*); Leeds and Potternewton (*W.D.R.*); Mickley near Ripon (*G.T.P.*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); Wakefield ! (*G.T.P.*); York ! (*Stainton's Manual*).

Œcophora minutella *L.* Huddersfield (*P.I.*); Scarborough (*Stainton's Manual*); York ! (*Stainton's Manual*).

Œcophora flavimaculella *Stn.* Among *Angelica sylvestris.* Harrogate !! (*J. Sang*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough (*P.I.*); York (*W.P.*).

Œcophora trisignella *Zell.* Huddersfield (*P.I.*).

Œcophora stipella *Clerck.* Blubberhouses (*Lord Walsingham*); Huddersfield (*Hobkirk's History of Huddersfield*); Richmond (*J. Sang*); Saddleworth Moors (*R. S. Edelston*); York (*Stainton's Manual*).

Œcophora augustella *Hüb.* Hexthorpe (*W. W.*); Tickhill (*W. W.*); York (— *Hind*).

Œcophora subaquilella *Edl.* Huddersfield (*P.I.*); Scarborough (*T. W.*); York (*Stainton's Manual*).

Œcophora flavifrontella *Hüb.* Guisborough Woods (*John Scott, Ent. W. Int.*, 1861, x. 68); Scarborough (*T. W.*).

Œcophora fuscescentella *Haw.* Bramham (*J. Sm.*); Doncaster (*W. W.*); Huddersfield (*P.I.*); Redcar ! (*J. Sang*); Scarborough (*T. W.*); York (*Stainton's Manual*).

Œcophora pseudo-spretella *Stn.* Abundant everywhere in houses, warehouses, &c. It is often very destructive in one's breeding-cages, the larvæ feeding on the pupæ, &c.

Endrosis fenestrella *Scop.* As abundant as the last species, and almost as great a nuisance.

Butalis fusco-æneella *Haw.* Grassington (*T. H. Allis ?*); (*Young Naturalist, August*, 1882).

Butalis senescentella *Stn.* Among thyme.
Richmond (*J. Sang*); Scarborough (*T. W.*); York (*Stainton's Manual*).

Butalis fusco-cuprella *Haw.* Scarborough (*T. W.*).

Butalis chenopodiella *Hüb.* Sheffield (*A. D.*); York (*Stainton's Manual*).

Butalis incongruella *Stn.* Occurs on heaths.
Huddersfield (*P.I.*); Scarborough ! (*T. W.*).

Pancalia Leuwenhoekella *L.* Bramham (*J. Sm.*); Huddersfield (*P.I.*); Richmond (*J. Sang*); York ! (*Stainton's Manual*).

Acrolepia granitella *Tr.* Larva feeds in the leaves of *Inula dysenterica.*
Redcar !! (*J. Sang*); Scarborough (*T. W.*).

Acrolepia betulella *Curt.* Richmond, one specimen (*J. Sang*).

Glyphipteryx fuscoviridella *Haw.* Doncaster !! (*W. W.*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); York (*Stainton's Manual*).

Glyphipteryx Thrasonella *Scop.* Huddersfield (*P.I.*); Scarborough !! (*Stainton's Manual*); York (*Stainton's Manual*).

Lord Walsingham states that the variety **cladiella** *Stn.* occurs at Blubberhouses.

Glyphipteryx Haworthella *Steph.* Huddersfield (*P.I.*); Scarborough !!, larva in seed-heads of cotton-grass (*T. W.*); Sheffield (*A.D.*); York (*Stainton's Manual*).

Glyphipteryx equitella *Scop.* Among *Sedum acre.*

Richmond !! (*J. Sang*); Scarborough (*T. W.*); York (*Stainton's Manual*).

Glyphipteryx Fischeriella *Zell.* Doncaster !! (*W. W.*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough !! (*T. W.* and *J. Sang*); York (*Stainton's Manual*).

Perittia obscuripunctella *Stn.* Should be looked for about honeysuckle.

York (*Stainton's Manual*).

Tinagma sericiella *Haw.* Huddersfield (*P.I.*); Scarborough !! (*Stainton's Manual*); York (*Stainton's Manual*).

Tinagma resplendella *Dougl.* Larva inside alder leaves at Scarborough !! (*T. W.*); Sheffield (*A.D.*).

Argyresthia ephippella *Fab.* Huddersfield (*P.I.*); near Redcar !! (*J. Sang*); Scarborough (*Stainton's Manual*); Sheffield (*A.D.*); York ! (*T. Wilson*).

Argyresthia nitidella *Fab.* Abundant no doubt everywhere.

Doncaster (*W. W.*); Edlington Wood (*G.T.P.*); Haigh (*G.T.P.*); Harrogate !! (*J. Sang*); Huddersfield !! (*G.T.P.*); Redcar !! (*J. Sang*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York ! (*Stainton's Manual*).

Argyresthia purpurascentella *Stn.* Out of hawthorn at Sheffield, July 22nd, 1848 (*H. T. Stainton*).

Argyresthia semitestacella *Curt.* Edlington !! (*W. W.*); Harrogate !! (*J. Sang*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough ! (*Stainton's Manual*); York ! (*Stainton's Manual*).

Argyresthia spiniella *Zell.* Blubberhouses (*Lord Walsingham*); Doncaster (*W. W.*); Huddersfield (*P.I.*); Richmond (*J. Sang*); Scarborough, larva in young stems of mountain ash (*T. W.*); Sheffield (*A.D.*); York (*Stainton's Manual*).

Argyresthia albistriella *Haw.* Doncaster (*W. W.*); Harrogate !! (*J. Sang*); Huddersfield (*P.I.*); Redcar !! (*J. Sang*); Richmond !! (*J. Sang*); Scarborough!! (*Stainton's Manual*); York (*T. Wilson*).

Argyresthia conjugella *Zell.* Larva in berries of mountain ash.

Edlington Wood (*W. W.*); Harrogate !! (*J. Sang*); Richmond !! (*J. Sang*); Scarborough !! (*J. Sang* and *T. W.*); Sheffield (*A.D.*); York ! (*Stainton's Manual*).

Argyresthia semifuscella *Haw.* Larva feeds in ash and sloe.

Harrogate (*J. Sang*); Huddersfield (*P.I.*); Richmond (*J. Sang*); Scarborough (*Stainton's Manual*); York ! (*Stainton's Manual*).

Argyresthia mendicella *Haw.* Huddersfield (*P.I.*); Redcar !!(*J. Sang*); Richmond !!(*J. Sang*); York ! (*Stainton's Manual*).

Argyresthia glaucinella *Zell.* Among oak, &c.

Sheffield (*A.D.*).

Argyresthia retinella *Zell.* Among birch.

Doncaster !! (*W. W.*); Richmond !! (*J. Sang*); Scarborough (*T. W.*); York ! (*Stainton's Manual*).

Argyresthia dilectella *Zell.* On juniper at Sheffield (*H. T. Stainton, Zool.*, 1849).

Argyresthia Andereggiella *Fisch.* Bramham (*J.Sm.*).

Argyresthia curvella *L.* Among apple.

Doncaster (*W. W.*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough ! (*Stainton's Manual*); York (*T. Wilson*).

Argyresthia sorbiella *Tr.* Huddersfield (*P.I.*); Richmond (*J. Sang*); Scarborough (*Stainton's Manual*); Sheffield (*A.D.*); York ! (*Stainton's Manual*).

Argyresthia pygmæella *Hüb.* Among sallow.

Doncaster ! (*W. W.*); Harrogate !! (*J. Sang*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough (*T. W.*); Sheffield (*A.D.*); York ! (*Stainton's Manual*).

Argyresthia Gœdartella *L.* A very beautiful species, and apparently abundant everywhere.

Doncaster ! (*W. W.*); Edlington Wood !! (*G.T.P.*); Harrogate !! (*J. Sang*); Huddersfield (*G.T.P.*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York (*T. Wilson*).

Argyresthia Brockeella *Hüb.* Also a very pretty and very common species.

Doncaster !! (*W. W.*); Harrogate !! (*J. Sang*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York ! (*T. Wilson*).

Cedestis farinatella *Zell.* Among firs.

Doncaster ! (*W. W.*); Harrogate !! (*J. Sang*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough (*T. W.*); York ! (*T. Wilson*).

Ocnerostoma pinariella *Zell.* Among firs.

Huddersfield (*P.I.*); Richmond (*J. Sang*); Scarborough (*T. W.*); York ! (*Stainton's Manual*).

Zelleria hepariella *Mann.* ♂ = **insignipennella** *Stn.* ♀ Richmond (*J. Sang*); Scarborough (*T. W.*).

Gracilaria Swederella *Thunb.* = **alchimiella** *Scop.* A beautiful species, very common among oaks.

Doncaster (*W. W.*); Edlington Wood (*G. T. P.*); Harrogate (*J. Sang*); Huddersfield ! (*G. T. P.*); Richmond (*J. Sang*); Scarborough (*P. I.*); Sheffield (*A. D.*); York (*T. Wilson*).

Gracilaria stigmatella *Fab.* Among poplars and sallows.

Huddersfield (*P. I.*); Richmond (*J. Sang*); Scarborough (*T. W.*); Sheffield (*A. D.*); York (*Stainton's Manual*).

Gracilaria stramineella *Stn.* I took this pretty species in Wharncliffe Woods, near Sheffield, on the occasion of the Yorkshire Naturalists' Union's visit there on September 14th, 1878 (*G. T. P.*); York (*Stainton's Manual*).

Gracilaria semifasciella *Haw.* Scarborough, common on maple (*T. W.*).

Gracilaria elongella *L.* Among alders.

Doncaster ! (*W. W.*); Huddersfield !! (*P. I.*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A. D.*); York ! (*Stainton's Manual*).

Gracilaria tringipennella *Zell.* Among plantain.

Flamborough Head (*E. H.*); Huddersfield (*P. I.*); Scarborough (*T. W.*); York ! (*Stainton's Manual*).

Gracilaria syringella *Fab.* Common among lilac, ash, and privet.

Doncaster (*W. W.*); Huddersfield (*G. C. B. M.*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A. D.*); York ! (*T. Wilson*).

Gracilaria auroguttella *Steph.* Among *Hypericum.*

Harrogate (*J. Sang*); Hexthorpe ! (*W. W.*); Huddersfield (*P. I.*); Scarborough (*T. W.*); Sheffield (*A. D.*); York (*Stainton's Manual*).

Gracilaria imperialella *Mann.* Three specimens at Richmond (*J. Sang*).

Coriscium Brongniardella *Fab.* York (*Stainton's Manual*).

Coriscium cuculipennella *Hüb.* Among privet.
Near Leyburn, one specimen (*J. Sang*); York (*Stainton's Manual*).

Coriscium citrinella *Fisch.* = **sulphurella** *Haw.* Scarborough (*T. W.*).

Ornix avellanæcolella *Stn.* Among hazel.
Doncaster !! (*W. W.*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); York (*Stainton's Manual*).

Ornix anglicella *Stn.* Among hawthorn, &c.
Doncaster !! (*W. W.*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); York (*Stainton's Manual*).

Ornix betulævorella *Dbl.* Among birch.
Doncaster ! (*W. W.*); Harrogate (*J. Sang*); Richmond (*J. Sang*); Scarborough (*T. W.*).

Ornix torquilella *Stn.* Among sloe.
Balby near Doncaster !! (*W. W.*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough (*T. W.*); York (*Stainton's Manual*).

Ornix Scoticella *Stn.* Among mountain ash.
Harrogate !! (*J. Sang*); Richmond !! (*J. Sang*); Scarborough (*T. W.*); York (*Stainton's Manual*).

Ornix Loganella *Stn.* Among birch.
Huddersfield (*P.I.*); Scarborough !! (*T. W.*); York (*Stainton's Manual*).

Ornix guttella *Haw.* Among apple.
Huddersfield (*Hobkirk's History of Huddersfield*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); York ! (*T. Wilson*).

Coleophora Fabriciella *Vill.* Scarborough (*Stainton's Manual*).

Coleophora alcyonipennella *Koll.* Among *Centaurea nigra.*

Hexthorpe near Doncaster ! (*W. W.*); Scarborough !! (*J. Sang* and *T. W.*); Sheffield (*A.D.*); York (*Stainton's Manual*).

Coleophora paripennella *Fisch.* On birch.

Richmond (*J. Sang*); Scarborough (*T. W.*); Sheffield (*A.D.*).

Coleophora lixella *Zell.* Larva on grasses.

Scarborough (*T. W.*).

Coleophora pyrrhulipennella *Fisch.* Abundant probably on all heaths.

Harrogate (*J. Sang*); Huddersfield !! (*G.T.P.*); Scarborough (*T. W.*); Sheffield (*A.D.*); Thorne (*W. W.*); York (*W.P.*).

Coleophora albicostella *Haw.* Among furze.

Richmond (*J. Sang*); Scarborough (*P.I.*); Sheffield (*A.D.*).

Coleophora anatipennella *Hüb.* Scarborough (*T. W.*); Sheffield (*A.D.*); York (*T. Wilson*).

Coleophora ardeæpennella *Scott.* Rossington !! (*W. W.*); York, on sallow (*T. Wilson*).

Coleophora palliatella *Zell.* Bishop's Wood, from oak (*W.P.*); Rossington !! (*W. W.*).

Coleophora ibipennella *Heyd.* Sheffield (*A.D.*); York (*T. Wilson*).

Coleophora currucipennella *Fisch.* Larva on birch.

In the Green Farm Wood, adjoining Sandal Beat, Doncaster (*W. W.*).

Coleophora niveicostella *Fisch.* York (*Stainton's Manual*).

Coleophora discordella *Zell.* Larva feeds on *Lotus.*

Flamborough Head (*E.H.*); Hexthorpe near Doncaster ! (*W.W.*); Scarborough !! (*P.I.* and *J. Sang*); Sheffield (*A.D.*); York (*Stainton's Manual*).

Coleophora genistæcolella *Dbl.* Scarborough ! (*Stainton's Manual*); abundant on *Genista anglica* on Strensall Common, York (*W.P.*).

Coleophora troglodytella *Stn.* Larva on leaves of *Eupatorium cannabinum*, &c.

Scarborough !! (*J. Sang* and *T.W.*); York (*Stainton's Manual*).

Coleophora graminicolella *Hein.* Should be looked for on *Lychnis.*

Doncaster, four specimens (*W.W.*).

Coleophora lineolella *Haw.* Huddersfield (*P.I.*).

Coleophora murinipennella *Fisch.* Larva feeds on the seeds of woodrush (*Luzula*).

Doncaster !! (*W.W.*); Scarborough (*T.W.*); Sheffield (*A.D.*); York (*Stainton's Manual*).

Coleophora cæspititiella *Zell.* Abundant no doubt everywhere where rushes grow. The white cases of the larvæ may often be seen in thousands on the seed-heads of rushes in autumn.

Blubberhouses (*Lord Walsingham*); Doncaster (*W.W.*); Haigh !! (*G.T.P.*); Harrogate !! (*J. Sang*); Huddersfield ! (*G.T.P.*); Redcar !! (*J. Sang*); Richmond !! (*J. Sang*); Sheffield (*A.D.*); York !! (*T. Wilson*).

Coleophora Tengstromella *Dbl.* Redcar !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York (*Stainton's Manual*).

Coleophora virgaureella *Stn.* Scarborough !!, larva on seeds of golden-rod (*J. Sang* and *T.W.*); Sheffield (*A.D.*).

Allium vineale *L.* Locally plentiful with **A. oleraceum** and **A. scorodoprasum** in lanes on the hillside above Collingham. J. Jackson ! M.W. York.

Schœnus nigricans *L.* In the boggy field between Aketon bleach-works and the Crimple brook. The second West Yorkshire station known. F. A. Lees. M.W. York.

Scirpus acicularis *L.* Marshy spot by the canal side under Hymen Wood, Barnsley. H. Johnson! S.W. York.

S. multicaulis *Sm.* In a wet grassy place below the beeches at west end of Black Fen, Bramham Park. F. A. Lees. M.W. York.

Carex dioica *L.* Aketon bog. F. A. Lees. M.W. York.

C. pallescens *L.* Clayey 'rides' of Lund and Lund Wood Close, West Woods, Bramham. F. A. Lees. M.W. York.

C. pendula *L.* Wet slopes, Hackfall! M.W. York.

C. pseudocyperus *L.* Bank of dyke bordering the 'farther Jungle' (south end of bog) Askham Bogs. F. A. Lees and J. Jackson. M.W. York.

C. saxumbra *Lees*, sp. nov.=**C. pilulifera** var. **Leesii** Ridley in Journ. Bot., May, 1881.

Root fibrous; stems many from one tuft not decumbent in fruit; leaves nearly as long as flower stem, ascending, not recurved; spikelets close, in an interrupted head, prolonged-oval; bracts not awlshaped, longer than spike, lowest truly leaf-like, not sheathing. Terminal catkin wholly male, sessile, glume lanceolate-acuminate. Female catkins 3—4, hardly distinct, erect, elongate-oval, glume lanceolate, gradually acuminate, with serræ on mid-rib and long awn. Perigynia stalked, downy, regular-ovate, fusiform, with broad-based rather rostrate bifid beak; nut globular, trigonous, and narrowed below.

Shady escarpments of large rocks by lake at Plumpton. July and August, 1880. F. A. Lees.

Rootstock densely tufted, falsely creeping, throwing up many flowering stems in each clump. Stems 12—20 inches, rough, angular, ascending, the outside ones curving upwards, not lying down later as fruit ripens, as in *C. pilulifera*. Leaves mainly though not wholly radical, flat, narrow, bright deep green with reddish sheaths below, ascending, not recurved, nearly or quite as long as stems. Spikelets 4—5, lowest one alone distinctly separate, aggregated into an interrupted kind of head (*C. divisa*-like), each spikelet prolonged, 8—12 flowered. Lowest bract truly leafy, twice to thrice as long as the combined spike; the second one even somewhat leafy and overtopping terminal spikelet. Male catkin single, terminal, sessile, hardly distinct from the first female one given off at its base; glume lanceolate-acuminate, pale of purple brown with a green midrib and paler margin. Female catkins 3—4, erect, long-oval, not globose (pill-like); glume red or purple brown, lanceolate-ovate, acuminate hardly cuspidate, with a green mid-rib, both that and the long awn with fine saw-like teeth, and pale border. Perigynia, stipitate, green, browner on outer face, downy, fusiform (spindle shaped) with a bent gradual beak, sub-trigonous with (often) one distinct rib; nut globose, trigonous, angled and narrowed below. The glumes and perigynia ascending, not spreading when ripe as in *C. pilulifera*.

The most striking differences between *C. saxumbra* and the *C. pilulifera* of our open moors will, from the above, be seen to consist in the following features :—(1) The habit of growth, in a large many-stemmed tuft in deep shade; (2) The much longer ascending not recurving leaves; (3) The generally androgynous facies of the whole spike, with very leafy lowest bract in place of an awl-shaped short one; (4) The elongate non-pill-like character of female spikelets; (5) The less cuspidate more gradually acuminate glumes with rougher awns; and (6) The greener, less bristly fruit, narrowing gradually to both ends, instead of being top-shaped. How

far these differences may be due to the effect of growth in shade acting through a long series of years, I am as yet unable to say.

The plate illustrating the foregoing diagnosis has been taken by permission from Trimen's Journal of Botany, wherein, before Dr. Boswell had seen the plant, Mr. H. N. Ridley considered it a variety of *C. pilulifera.*

Glyceria plicata *Fr.* Wet grassy ground below Etchell Crags, Scarcroft. F. A. Lees. M.W. York.

Sclerochloa distans *Bab.*
Canal banks near Barnsley. H. Johnson. S. W. York.

Poa compressa *L.* Wall, Moor-end, Boston Spa.
F. A. Lees and T. Hick. M.W. York.

Hordeum sylvaticum *Huds.*
Bilton Haggs near Wighill. F. A. Lees. M.W. York.

Asplenium adiantum-nigrum *L.* South east face of ruins, Spofforth Castle. Still existent in 1880. J. Emmet!
M.W. York.

Nephrodium Borreri *Newm.* Lund Wood Close, West Woods, Bramham. J. Emmet! Woods bordering Stockeld Park on the east. F. A. Lees. M.W. York.

Polypodium Robertianum *Hoffm.* In the old masonry of the terrace wall in front of the ruined house at Bramham Park. J. Emmet! Probably not truly wild, but at any rate thoroughly established. F. A. Lees. M.W. York.

Lycopodium selago *L.* In the Brayton railway cutting about a mile from Selby. W. N. Cheesman. A curious occurrence in such a place at so low a level. A relic, or an introduction? F. A. Lees. M.W. York.

Equisetum hyemale *L.* Hedge bank near Scholes.
H. Ibbotson! M.W. York.

Nitella opaca *Br.* Pool by road between Rigton village and Etchell Crags. F. A. Lees. M.W. York.

Tolypella glomerata *Leonh.* In a small lake on estate of Earl Cathcart, near Thirsk. Geo. Nicholson. N.E. York.

YORKSHIRE NATURALISTS' UNION.

BOTANICAL SECTION.

The Fifth Annual Meeting was held at Bradford, on the 4th of March, 1882. The following officers were elected to serve for the year 1882:—

President: THOMAS HICK, B.A., B.Sc., Harrogate.

Secretary for Phanerogamic Botany:

H. T. SOPPITT, Saltaire.

Secretary for Cryptogamic Botany:

G. E. MASSEE, Scarborough.

A small committee was chosen, at the suggestion of Prof. W. C. Williamson, F.R.S., the President of the Union, to investigate the life history of *Puccinia graminis.*

Mr. Soppitt being unable to act as Secretary for Phanerogamic Botany, Mr. ALFRED DENNY, assistant to the Professor of Biology in the Yorkshire College, Leeds, was chosen in his place.

With reference to the proposed investigation of the life history of *Puccinia graminis*, the following articles appeared in the 'Naturalist' for July, 1882:—

Vol. vii., pp. 191—195,

Notes on *Puccinia graminis.* By Geo. Massee.

Vol. vii., p. 195,

Puccinia graminis. By Thos. Hick, B.A., B.Sc., &c.

THE FLORA OF RIPON AND NEIGHBOURHOOD.

By
REV. HENRY H. SLATER, M.A., F.Z.S., M.B.O.U.,
Vice-President of the Yorkshire Naturalists' Union,
Member of the Botanical Record Club, etc.

The writer acknowledges with gratitude the assistance he has received from many brother—and sister—Botanists, so many that he will not attempt to give a list of them here, but will content himself by appending their names, as authority, to their information. Where no name occurs after a locality given for a plant, the writer wishes it to be understood to be the result of his own experience, whether previously recorded by others or not.

Careful work will doubtless reveal many other species, especially amongst the *Rosæ*, *Rubi*, *Salices*, *Gramina*, *Chenopodiaceæ*, and *Polygonaceæ*, which the writer confesses to have somewhat neglected, mostly from a lack of the standard literature on the subject.

The Latin names and the numbers which precede them refer to the London Catalogue of Plants, Eighth Edition (1877).

THALAMIFLORÆ.

4A. **Thalictrum majus.** Greater meadow-rue. Dry banks and thickets. Wicliffe Lane; Mackershaw Wood. Not abundant.

6B. **T. flavum.** Common meadow-rue. Damp places, not abundant. Sharow Mires.

7. **Anemone Pulsatilla.** Pasque flower. Calcareous pastures. Near North Stainley, rare (Rev. R. A. Summerfield).

8. **A. nemorosa.** Wood anemone. Woods and hedges, abundant.

11. **Myosurus minimus.** Mousetail. Gravelly fields. Staveley, near Knaresborough (Baines).

12. **Ranunculus circinatus.** Pools and still waters. The Canal (Miss Morton).

14A. **R. truncatus.** Pools and ditches. Pillmoor Carr, near Sharow, etc.

14B. **R. floribundus.** Not uncommon in ponds.

16. **R. Drouetii.** Drouet's ranunculus. Ponds, etc. Queen Mary's Dubb; small pond near North Bridge, etc.

21. **R. hederaceus.** Ivy-leaved water crowfoot. Ditches and streams, not uncommon.

22. **R. sceleratus.** Celery-leaved crowfoot. Marshes and wet places, not common. Near Hewick Bridge.

24. **R. Flammula.** Lesser spear-wort. Wet places, common.

26. **R. Lingua.** Greater spear-wort. Marshes, uncommon. Sharow Mires; Marfield, Masham. Near Copgrove (Baines).

27. **R. auricomus.** Wood crowfoot. Woods, not uncommon. Clotherholme; Mackershaw; Studley, etc.

28. **R. acris.** Buttercup. Fields, abundant.

29. **R. repens.** Creeping buttercup. Fields and woods, common.

30. **R. bulbosus.** Bulbous buttercup. Grass land, very common.

34. **R. arvensis.** Corn crowfoot. Cornfields, a colonist. Near canal (Miss Morton). So plentiful in some cornfields near Markington, in 1881, as to give them a bright yellow colour.

35. **R. Ficaria.** Lesser celandine. Everywhere common.

36. **Caltha palustris.** Marsh marigold. Common in all wet places.

38. **Trollius europæus.** Globe flower. Marshy fields. Clotherholme; Burton Leonard; Masham, Copgrove (Baines).

39. **Eranthis hyemalis.** Winter aconite. Occasional by Skell banks, naturalised.

40. **Helleborus viridis.** Green hellebore. Thickets, etc., on a calcareous soil. Banks near Tanfield. Fountains Abbey (Baines); river banks near Knaresborough (Baines).

41. **H. fœtidus.** Stinking hellebore. Similar places to last, generally naturalised. Norton Conyers; Copt Hewick.

42. **Aquilegia vulgaris.** Columbine. Woods and thickets, rare. Masham; Railway banks, near Tanfield; Baines records it from Fountains Abbey—it grows sparingly in Mackershaw Wood.

44. **Aconitum Napellus.** Monkshood. Wooded banks of streams. Spa Gill, 1881 (Mrs. Berkeley).

45. **Actæa spicata.** Herb Christopher. Thickets on a calcareous soil, very rare. Not far from Masham; Nidderdale.

46. **Berberis vulgaris.** Barberry. Hedges and woods, rare. Clotherholme; on rocks at Fountains Abbey; Leckby Carr (Baines).

48. **Nuphar lutea.** Yellow water lily. Ponds, not common. Near the Rifle range.

51. **Papaver Rhœas.** Common poppy. Cornfields and waste places, abundant.

52A. **P. dubium.** Long smooth-headed poppy. Clover and cornfields, occasional. Blois Hall (1881).

53. **P. Argemone.** Long rough-headed poppy. Cornfields, a not uncommon colonist.

55. **Meconopsis cambrica.** Welsh poppy. Old walls and hedge banks. Near Mickley.

57. **Chelidonium majus.** Greater celandine. Old walls and waste ground, rare. Walls of Fountains Abbey, not plentiful; also at Hackfall (Mrs. Berkeley).

58. **Corydalis lutea.** Yellow fumitory. Fountains Abbey and Hall, scarcely wild; also at Swinton (Mrs. Berkeley).

59. **C. claviculata.** White climbing fumitory. Thickets, not common. Plumpton rocks, near Knaresborough; Hookstone Crags, Knaresborough (Baines).

62. **Fumaria muralis.** One plant on a rubbish heap near Bishopton (1880).

64. **F. officinalis.** Common fumitory. Cornfields and waste ground, abundant.

69. **Raphanus Raphanistrum.** Wild radish. Cornfields and waste ground, not uncommon.

71. **Sinapis arvensis.** Charlock. Cultivated ground, very common.

76. **Brassica Napus.** Rape. An occasional escape from cultivation.

78. **B. Rapa.** Turnip. Ditto. River sides and cultivated land.

83. **Sisymbrium officinale.** Hedge mustard. Hedges and waste land, common.

86. **S. Alliaria.** Hedge garlic. Waste ground and hedge-banks, very common.

88. **Hesperis matronalis.** Dame's violet. Said by Baines not to be rare on waste ground near Ripon, but it does not seem to occur now.

91. **Cheiranthus Cheiri.** Wall-flower. Rocks and old ruins. Knaresborough, on rocks (Mrs. Berkeley).

93. **Cardamine amara.** Large-flowered bitter-cress. Marshes, uncommon. Sharow mires; Gormire and Thirsk (Baines).

94. **C. pratensis.** Cuckoo-flower. Common everywhere in damp places.

95. **C. hirsuta.** Hairy bitter-cress. Shady places, not uncommon.

96. **C. sylvatica.** Wood bitter-cress. In similar places to last, less common.

98. **Arabis thaliana.** Thale-cress. Walls and banks, common.

102. **A. hirsuta.** Hairy wall-cress. Banks and walls, not uncommon.

104. **A. perfoliata.** Smooth tower-mustard. Hedges and dry banks. Lanes near Thirsk (Teesdale); near Ripon (W. Brunton); near Skelton and Helperby (Rev. J. Dalton); railway bank between Hutton Conyers and Melmerby (F. A. Lees).

105. **Barbarea vulgaris.** Yellow rocket. Marshy ground and river banks. Occasional by the Ure.

110. **Nasturtium officinale.** Water-cress. Ditches and slow streams. Near How Hill, Sharow, &c.

111. **N. sylvestre.** Creeping-cress. River banks and wet places. "Banks of the Ure, near Ripon" (Baines). Other damp places.

115A. **Cochlearia officinalis.** Scurvy-grass. Not uncommon by the River Ure; gets more plentiful above Tanfield.

118. **Draba verna.** Whitlow grass. Walls, dry banks, and gravel walks, common.

124. **Alyssum calycinum.** Calycine alyssum. A cornfield alien. One plant in a field near the River Ure by Ripon, in 1880 (Mrs. Berkeley).

128. **Thlaspi arvense.** Penny cress. Dry fields and road sides, but uncommon. Roadside near Littlethorpe; Givendale.

132. **Teesdalia nudicaulis.** Naked-stalked Teesdalia. Dry bare ground. South of Hutton Moor (W. Brunton, also Baines).

134. **Capsella Bursa-pastoris.** Shepherd's purse. A common weed.

135. **Lepidium latifolium.** Broad-leaved pepper-wort. "On a rock on the left going out of Kirkgate, Knaresborough" (Baines); rocks at Brompton, near Knaresborough (Baines).

138. **L. campestre.** Pepper-wort. Fields, not uncommon.

139. **L. Smithii.** Smooth-fruited pepper-wort. Dry fields, less common than the last.

142. **Senebiera Coronopus.** Wart-cress. Waste ground. Occurred sparingly in 1880 in a corn-field near Hewick Bridge.

144. **Reseda lutea.** Weld. Dry banks and waste ground. By the Skell (Miss Plues); Quarry Moor and Whitcliffe (Miss Morton); Hutton Moor.

145. **R. Luteola.** Wild mignonette, Dry banks and waste ground, rarer than last. Railway banks near Masham; near Dishforth.

149. **Helianthemum vulgare.** Rock rose. Dry hilly places. Roadside near Thieves' Gill; Mackershaw and Whitcliffe Lane; hills near Masham.

151. **Viola palustris.** Bog violet. Marshy meadows, not common. Hutton Moor (rare). Also near Swinton (Mrs. Berkeley).

152. **V. odorata.** Sweet violet. Woods and hedges, common. The white variety not quite as common.

154. **V. hirta.** Hairy violet. Woods on limestone. Mackershaw Wood; Tanfield; Copgrove (Baines).

155. **V. sylvatica.** Wood violet. Woods and hedge banks. Both varieties seem equally common: var. *Riviniana* in more shady, and var. *Reichenbachiana* in more open spots.

157. **V. canina.** Dog violet. Marshy places. Wet ground near Blois Hall.

160. **V. tricolor.** Wild pansy. Riversides and waste ground, abundant. Var. *arvensis* common in cornfields.

162. **V. lutea.** Yellow pansy. Mountainous pastures. Sawley Moor (Baines); Kirby Hill (Baines); Nidderdale (Miss Morton).

163. **Drosera rotundifolia.** Round-leaved sundew. Turfy and sphagnous bogs. Marfield, Masham; Leckby Carr.

164. **D. anglica.** Great sundew. Similar places to last. Leckby Carr, plentiful. Baines notes the remarkable height (10 inches) to which some specimens grow in this locality; specimens of the last reach nearly 7 inches in height, which is equally unusual.

165. **D. intermedia.** Intermediate sundew. Recorded from Leckby Carr (see Botanical Record, 1880, p. 52). It was not to be found there in 1881, when I carefully sought for it with Mr. F. A. Lees and the Rev. W. Fowler.

166. **Polygala vulgaris.** Milkwort. Heaths and dry fields, common.

175. **Dianthus plumarius.** Wild pink. Old walls. Fountains Abbey, where it is carefully protected and apparently spreading. Baines records it as *D. caryophyllus*, from which it may be easily distinguished by its digitate, and not crenate-dentate, petals.

177. **Saponaria officinalis.** Soapwort. Grows abundantly on the banks of the Swale near Richmond; should occur nearer Ripon also; Knaresborough (Baines).

178. **Silene inflata.** Bladder campion. Fields and riversides, common. Var. *puberula*, the hairy variety, is not so common as the glabrous one; near Masham however it seems to be commonest.

181. **S. anglica.** English catchfly. Gravelly places and cornfields, not common. Plentiful in cornfields near Leckby Carr, 1881.

185. **S. nutans.** Nottingham catchfly. On calcareous rocks. Abbey plain, Knaresborough, on rocks (Baines).

187. **S. noctiflora.** Night-flowering catchfly. Fields and banks, not uncommon.

188. **Lychnis vespertina.** White campion. Fields, common.

189. **L. diurna.** Red campion. Woods and fields, common.

190. **L. Flos-cuculi.** Ragged robin. Wet places, common.

193. **L. Githago.** Corn cockle. Cornfields, local.

198. **Cerastium semi-decandrum.** Little mouse-ear chickweed. Waysides, etc., abundant.

199. **C. glomeratum.** Clustered mouse ear. Waysides and fields, not so common as last.

200. **C. triviale.** Narrow-leaved mouse-ear. Fields, abundant.

203. **C. arvense.** Field mouse-ear. Not uncommon in gravelly places. A more glabrous variety, with large flowers, often solitary, and rigid growth, is var. *suffruticulosum* L.

205. **Stellaria aquatica.** Water chickweed. Marshes and wet places, not common. Sharow Mires.

206. **S. nemorum.** Wood stitchwort. Damp shady woods, not common. Clotherholme (Miss Morton); Mackershaw; Hackfall (Baines).

207. **S. media.** Chickweed. Everywhere abundant. Var. *Boræana* sparingly on sandy places by the Ure.

208. **S. Holostea.** Stitchwort. Abundant everywhere.

209. **S. glauca.** Bog stitchwort. Wet places, not common. Sharow Mires.

210. **S. graminea.** Grass-leaved stitchwort. Woods and hedges, pretty common.

211. **S. uliginosa.** Water stitchwort. Wet woods and by ditches, not common. Sharow Mires.

212. **Arenaria trinervis.** Plantain-leaved sandwort. Shady places, common.

213. **A. serpyllifolia.** Thyme-leaved sandwort. Walls and dry places, common. Var. *leptoclados*, with lanceolate acute sepals, and gratent fruit stalks, not uncommon on walls.

218. **Alsine verna.** Vernal sandwort. Banks of the Swale, near Richmond, plentiful. Likely to occur on lower parts of that river near Ripon.

220. **A. tenuifolia.** Fine-leaved sandwort. Walls and sandy places, rare. Walls of Fountains Abbey ; gravel-pits near Copgrove (Baines).

223. **Sagina apetala.** Small-flowered pearl-wort. Dry waste places, not unfrequent.

224. **S. ciliata.** Fringed pearl-wort. Gravelly places, less common than the last.

225. **S. procumbens.** Procumbent pearl-wort. Garden walks and waste places, common.

229. **S. nodosa.** Knotted pearl-wort. Sandy places, not very common. East end of the old race-course.

230. **Spergula arvensis.** Corn spurrey. Cornfields, very common.

240. **Scleranthus annuus.** Knawel. Cornfields, occasional.

242. **Montia fontana.** Water blinks. By mossy streamlets, not common. Hutton Moor ; Healey.

250. **Hypericum perforatum.** Common St. John's wort. Hedges and waste ground, common.

251. **H. dubium.** Woods and damp places. In a stone quarry at Hutton (Baines).

252. **H. tetrapterum.** Square-stalked St. John's wort. Woods and waste ground, not uncommon.

254. **H. humifusum.** Creeping St. John's wort. Gardens and banks, not uncommon.

256. **H. pulchrum.** Beautiful St. John's wort. Waste ground on a stiff soil, common.

257. **H. hirsutum.** Hairy St. John's wort. Woods, not common. Fountains and Mackershaw.

258. **H. montanum.** Mountain St. John's wort. Woods and copses on limestone, rare. In fair abundance in Fountains and Mackershaw Woods, and that vicinity; also Thieves' Gill; also Kirby Malzeard (Mrs. Berkeley).

259. **H. elodes.** Water St. John's wort. Spongy bogs. Hookstone Crags, Knaresborough (Baines).

262. **Malva moschata.** Musk mallow. Dry banks and roadsides, not common. Copt Hewick; Boroughbridge.

263. **M. sylvestris.** Common mallow. Hedges and waste ground, common.

264. **M. rotundifolia.** Dwarf mallow. Waste places and roadsides, common.

266. **Tilia intermedia.** Lime tree. Woods and copses.

268. **Radiola millegrana.** Flax-seed. Wet gravelly places, not uncommon. Often overlooked on account of its small size.

269. **Linum catharticum.** Mountain flax. Dry fields, common.

270. **L. perenne.** Perennial flax. Mackershaw Wood (W. Brunton).

272. **L. usitatissimum.** Flax. Fields, an escape. Occurred in plenty in 1880 (but not in 1881) in the field on the town side of the North Bridge.

273. **Geranium sanguineum.** Bloody cranes-bill. On rocks near S. Robert's Church, Knaresborough (Baines). Verified by Mrs. Berkeley in 1881.

274. **G. phœum.** Dusky cranes-bill. Thickets. Scriven Park, Knaresborough (Baines); roadsides near Swinton.

275. **G. sylvaticum.** Wood cranes-bill. Woods, not very common. Clotherholme ; Hackfall.

276. **G. pratense.** Meadow cranes-bill. Fields and river banks, common.

277. **G. pyrenaicum.** Perennial cranes-bill. Fields. Sowerby near Thirsk (Baines).

G. striatum. Pencilled cranes-bill. Woods and hedges, rare. It occurred two years in succession in a copse near Copt Hewick, but has now been extirpated.

278. **G. molle.** Dove's-foot. Pastures and waste ground, common.

279. **G. pusillum.** Small-flowered cranes-bill. Fields and waste places, not uncommon.

280. **G. rotundifolium.** Round-leaved cranes-bill. Waste ground and fields, rare. Copgrove and Knaresborough (Baines).

281. **G. dissectum.** Jagged cranes-bill. Hedgebanks and waste ground, common.

282. **G. columbinum.** Long-stalked cranes-bill. Gardens and waste places, not uncommon.

283. **G. lucidum.** Shining cranes-bill. Hedgebanks and rocks, not uncommon. Masham ; Hutton Moor ; Rocks at Knaresborough (Baines), etc.

284. **G. Robertianum.** Herb Robert. Abundant everywhere. A white variety in Hackfall and Wicliffe Lane (Miss Morton).

285. **Erodium cicutarium.** Heron's-bill. Waste ground, not uncommon.

288. **Oxalis Acetosella.** Wood sorrel. Woods, abundant.

CALYCIFLORÆ.

294. **Ilex Aquifolium.** Holly. Woods and hedges, common.

295. **Euonymus europæus.** Spindle-tree. Woods. Mackershaw Wood; near Priory Gate, Knaresborough (Baines).

296. **Rhamnus catharticus.** Buckthorn. Hedges and waste ground, rare. Mickley; Knaresborough (Baines).

297. **R. Frangula.** Alder buckthorn. Wet woods. Near Studley; Leckby Carr; Copgrove (Miss Morton).

298. **Acer Pseudo-platanus.** Sycamore. Woods and hedges.

299. **A. campestris.** Maple. Woods and hedges, common.

300. **Ulex europæus.** Gorse. Waste ground.

303. **Genista anglica.** Needle greenweed. Heaths, rare. Brimham Rocks (Miss Morton).

305. **G. tinctoria.** Dyer's greenweed. Woods and waste ground, rare. Sutton; Cowmire, near Galphay (Miss Morton); Railway banks near Hutton Conyers.

306. **Sarothamnus scoparius.** Broom. Woods and waste ground, not very common.

307. **Ononis spinosa.** Thorny rest-harrow. Dry fields and banks, rare. Near Thieves Gill, in small quantity; the following species abundant there.

308. **O. arvensis.** Common rest-harrow. Fields and river-sides, abundant.

310. **Anthyllis vulneraria.** Kidney vetch. Meadows and dry waste ground, common.

314. **Medicago lupulina.** Black medick. Fields and hedges, not common. Generally glabrous.

318. **Melilotus officinalis.** Melilot. Whitcliffe Lane (Miss Morton); Littlethorpe (Miss Morton); Bishopton.

323. **Trifolium pratense.** Red clover. Fields, common.

324. **T. medium.** Zig-zag clover. Woods and pastures, not common. By the river near Sharow.

329. **T. arvense.** Hare's-foot trefoil. Waste ground and dry fields, rare. "Blind pit on Hutton Moor" (Baines)

332. **T. scabrum.** Rough trefoil. Dry sandy places. Eller shaw Hill (Mr. Brunton).

336. **T. hybridum.** Alsike. Fields, not uncommon.

337. **T. repens.** White clover. Fields, abundant.

338. **T. fragiferum.** Strawberry-headed trefoil. Meadows and wet places, rare. In an old quarry near Whitcliffe (or Wicliffe) Lane.

339. **T. procumbens.** Hop trefoil. Meadows and waste ground, abundant.

340. **T. minus.** Lesser yellow trefoil. Waste ground, common.

341. **T. filiforme.** Slender trefoil. Waste ground, common.

342. **Lotus corniculatus.** Bird's-foot trefoil. Fields and waysides, common.

344. **L. major.** Greater bird's-foot trefoil. Fields and waysides, not uncommon.

350. **Astragalus hypoglottis.** Purple milk-vetch.. Dry calcareous hills, rare. Masham.

351. **A. glycyphyllus.** Woods and hedges on a calcareous soil. By the road from Haxby to Allerton Park, and other places near Knaresborough (Baines); near Sleningford (Baines); old quarry near Clotherhome (F. A. Lees); hedge near Queen Mary's Dubb (F. A. Lees); hedge near the Rifle Range, Ripon.

352. **Ornithopus perpusillus.** Bird's foot. Dry places, uncommon. Hutton Moor (Baines); Road from Ripon to Galphay.

356. **Vicia hirsuta.** Hairy tare. Hedges, abundant.

357. **V. tetrasperma.** Smooth tare. Hedges and cornfields, not uncommon.

359. **V. Cracca.** Tufted vetch. Hedges and bushy places, common.

361 **V. sylvatica.** Wood vetch. Woods, rare. Old wood near Hutton Moor (Rev. J. Dalton).

362. **V. sepium.** Bush vetch. Woods and hedges, common.

364. **V. sativa.** Common tare. A common escape from cultivation.

365A. **V. angustifolia.** Narrow-leaved vetch. Waste ground and dry places, occasional. Sharow.

366. **V. lathyroides.** Spring vetch. Reported to grow at Mickley Barrows (or Burrows).

371. **Lathyrus pratensis.** Meadow vetchling. Fields and roadsides, abundant.

376. **Orobus tuberosus.** Bitter vetch. Woods and rocky places, common.

378. **Prunus spinosa.** Blackthorn. Woods and hedges, abundant.

381. **P. Avium.** Wild cherry. Woods and hedgerows, often planted.

383. **P. Padus.** Bird cherry. Woods in hilly districts. Hackfall; Tanfield.

385. **Spiræa ulmaria.** Meadow-sweet. Woods and damp fields, abundant.

386. **S. Filipendula.** Drop-wort. Dry banks on calcareous soil. Used to be pretty common by the R. Ure near Ripon, but is now getting very rare. Near Copt Hewick (J. S. Hurst).

387. **Agrimonia Eupatoria.** Agrimony. Fields and hedge-banks, common.

389. **Sanguisorba officinalis.** Burnet. Fields, especially in hilly districts, common.

390. **Poterium Sanguisorba.** Salad burnet. Fields, common.

392. **Alchemilla arvensis.** Parsley piert. Dry gravelly fields, abundant.

393. **A. vulgaris.** Lady's mantle. Fields, common.

397. **Potentilla Fragariastrum.** Barren strawberry. Everywhere common.

400. **P. Tormentilla.** Tormentil. Marshy and heathy places, common.

402. **P. reptans.** Creeping cinquefoil. Meadows, pastures, and waysides, common.

403. **P. anserina.** Silver-weed. Waysides, abundant.

405. **P. argentea.** Hoary cinquefoil. Plumpton near Knaresborough (Baines).

407. **Comarum palustre.** Marsh cinquefoil. Bogs and marshy fields, not uncommon. Sharow Mires ; Marfield, Masham ; Pillmoor Carr near Blois Hall ; Whitemere, Hutton Moor ; Leckby Carr ; Gormire under Hambledon.

408. **Fragaria vesca.** Wild strawberry. Woods and hedge-banks, common.

410. **Rubus Idæus.** Wild raspberry. Damp hilly thickets, not common. Hackfall ; Dishforth.

411. **R. suberectus.** Red-fruited bramble. Woods and thickets. Dallow-gill, Ripley (Baines).

451. **R. cæsius.** Dewberry. Sandy places, common.

452. **R. saxatilis.** Stone bramble. In woods, usually in rocky or stony places. Hackfall (Baines) ; Mackershaw, on ordinary turf.

454. **Geum urbanum.** Common avens. Woods and hedges, common.

455. **G. intermedium.** Hybrid between 454 and 456. Not uncommon in woods. Mackershaw ; woods near Masham ; Hackfall, etc.

455. **G. rivale.** Water avens. Woods and moist pastures, common. Remarkable monstrosities not uncommon in woods near Masham.

458. **Rosa spinosissima.** Burnet rose. Thickets and hedges, not common. Sleningford ; Masham.

463c. **Rosa suberecta.** Downy rose. Woods and thickets. Hackfall.

468e. **R. dumalis.** Dog rose. Hedges, rare. Near Mickley.

470b. **R. bibracteata.** Trailing dog-rose. Hedges, near Blois Hall.

473. **Cratægus oxyacantha.** Hawthorn. Hedges and woods, abundant.

475. **Pyrus Aria.** White beam-tree. Woods and rocks, often planted. Rocks near Knaresborough (Mr. Brunton); Studley.

476. **P. Aucuparia.** Mountain ash. Woods, especially in hilly districts, and hedges (where it is often planted). Hackfall; Hedges between Sharow and Dishforth.

482. **P. Malus.** Crab apple. Woods and hedges, common.

483. **Lythrum salicaria.** Purple loose-strife. Wet places, not uncommon. Sharow mires.

486. **Epilobium angustifolium.** Rose-bay. Banks and copses; Quarry Moor (Mrs. Berkeley).

487. **E. hirsutum.** Great hairy willow-herb. Wet places, common.

488. **E. parviflorum.** Small-flowered willow-herb. Damp places, common.

489. **E. montanum.** Broad-leaved willow-herb. Dry banks, etc., common.

494. **E. palustre.** Marsh willow-herb. Wet places, not uncommon.

501. **Circæa lutetiana.** Enchanter's nightshade. Damp woods, not uncommon. Sharow mires; Hackfall; Mackershaw.

503. **Myriophyllum verticillatum.** Whorled water-milfoil. Still water, not uncommon. Sharow mires; River Ure (Miss Morton).

504. **M. spicatum.** Spiked water-milfoil. Still water, rare. River Ure, below Hewick bridge. Canal (Miss Morton).

505. **M. alterniflorum.** Alternate-flowered water-milfoil. Still water, commoner than last. River Ure and canal.

506. **Hippuris vulgaris.** Mare's tail. Stagnant water, not common. Pond in Bell wood, Knaresborough (Baines). Pond on the old Race-course, Ripon. Baines records it from Staveley Carrs, which are now completely drained.

507. **Callitriche verna.** Water star-wort. Pools and wet places, common.

509B. **C. platycarpa.** Sharow mires, in small quantity.

510. **C. hamulata.** Whitemere (or Raygill Dyke) on Hutton Moor. Var. *pedunculata* in other small ponds on Hutton Moor ; Sharow mires.

513. **Bryonia dioica.** Red-berried bryony. Hedges, abundant.

514. **Ribes grossularia.** Gooseberry. Both varieties occur in woods and hedges, probably introduced by the agency of birds.

515. **R. alpinum.** Alpine currant. Common on all rocks and walls near Fountains, doubtless originally introduced. Baines records it from woods near Ripon, but I have only seen one bush outside the grounds of Fountains, which was shewn to me by the Rev. J. S. Tute on the banks of Markington beck, and which had probably escaped from a garden or was sown by the agency of birds.

517. **R. nigrum.** Black currant. Woods and hedges, probably sown by birds.

525. **Sedum acre.** Yellow wall stone-crop. Walls and roofs, not uncommon. Fountains, &c.

527. **S. reflexum.** Crooked yellow stone-crop. Is said to grow on old walls in this neighbourhood. Plentiful in cottage gardens.

530. **Sempervivum tectorum.** Houseleek. Walls and roofs of cottages, occasional.

535A. **Saxifraga crenata.** Grounds at Fountains, not wild.

540. **S. tridactylites.** Rue-leaved saxifrage. Walls, uncommon. Sharow, rare; Swinton.

543. **S. granulata.** Meadow saxifrage. Dry meadows and banks, local. Sharow; Old Racecourse (Miss Morton); Railway banks near Hutton Conyers.

549. **Chrysosplenium oppositifolium.** Common golden saxifrage. Damp places and streams in woods, common.

550. **C. alternifolium.** Alternate-leaved golden saxifrage. In similar places to, but much rarer than last. Hackfall (J. Carter); near Tanfield Hall (Baines); Path side near Fountain's Abbey (Baines).

551. **Parnassia palustris.** Grass of Parnassus. Wet places, not common. Sparingly by the Ure; Hutton Moor; Cowmire near Galphay (Miss Morton).

552. **Hydrocotyle vulgaris.** Marsh pennywort. Marshes, not uncommon. Cowmire, Galphay (Miss Morton); a marshy field below Blois Hall; Gormire under Hambledon; Leckby Carr; Whitemere (Raygill dyke); on Hutton Moor; etc.

554. **Sanicula europæa.** Wood sanicle. Woods, abundant.

557. **Cicuta virosa.** Water hemlock. Ditches. In a pond near the Park lawn, Knaresborough (Baines).

559. **Helosciadium nodiflorum.** Marsh-wort. Marshes and riversides, not uncommon. Banks of the Ure. Var. *repens* on the road from Knaresborough to Ripley and by Scriven Park Lodge; also in wet places in a wood below Boltby Scarr, Thirsk (Baines).

565. **Ægopodium Podagraria.** Gout-weed. Waste damp places, not uncommon.

569. **Bunium flexuosum.** Earth-nut. Woods and meadows, plentiful.

570. **Pimpinella Saxifraga.** Burnet-saxifrage. Meadows, not uncommon.

571. **P. magna.** Greater burnet-saxifrage. Not a common plant in general, but plentiful by every hedge near Ripon.

573. **Sium angustifolium.** Narrow-leaved water parsnip. Marshes, not uncommon. Near Hewick Bridge.

574. **Bupleurum rotundifolium.** Hare's ear. Cornfields. "In every ploughing field near Copgrove" (Rev. J. Dalton, 1820). Near Ripon (Baines). Has not been recently found.

578. **Œnanthe fistulosa.** Water drop-wort. Marshes, not common. Sharow mires. Pillmoor Carr near Sharow.

581. **Œ. Lachenalii.** "Boggy places, ponds, and ditches near Ripon" (Mr. Brunton). "Very common in all wet places about Copgrove" (Rev. J. Dalton). These records do not agree with modern experience; the writer has found one plant only by the Ure below Hewick Bridge on the south side of the river.

582. **Œ. crocata.** Hemlock water drop-wort. Ditches and river sides, not uncommon.

583. **Œ. Phellandrium.** Fine-leaved water drop-wort. In shallow pools and ditches, not common. Pillmoor Carr near Sharow.

585. **Æthusa cynapium.** Fool's parsley. Waste ground and cultivated land, frequent.

586. **Fœniculum vulgare.** Fennel. Sea cliffs. Occurs occasionally as an escape from gardens. Near Sharow.

589. **Silaus pratensis.** Pepper-saxifrage. Fields, not uncommon. Near Mackershaw. Bridge Hewick. Railway banks near Hutton Conyers.

592. **Angelica sylvestris.** Wild Angelica. Woods, especially in damp places, common.

597. **Heracleum sphondylium.** Cow parsnip. Fields and hedges, abundant.

599. **Daucus carota.** Wild carrot. Dry fields and waste ground, not very abundant.

600. **Caucalis daucoides.** Bur-parsley. Borders of fields. Ploughing fields between Thornbrough and Tanfield (Rev. J. Dalton). Near Ripon (W. Brunton). Knaresborough (Baines).

601. **Torilis infesta.** Spreading hedge-parsley. Cornfields near Ripon (Baines). A few plants near Copt Hewick (1880).

602. **T. Anthriscus.** Erect hedge-parsley. Fields and waysides, common.

604. **Chærophyllum Anthriscus.** Beaked parsley. Hedge banks.

606. **C. sylvestre.** Wild beaked parsley. Under or near hedges, common.

607. **C. temulum.** Rough chervil. Hedges and woods, common.

608. **Myrrhis odorata.** Sweet cicely. Not uncommon by water. Banks of the Ure, etc.

609. **Scandix pecten-veneris.** Shepherd's needle. Cornfields, very common.

610. **Conium maculatum.** Hemlock. Waste ground, uncommon. Under the rocks at Fountains.

614. **Hedera Helix.** Ivy. On trees and walls, also on the ground, abundant.

616. **Cornus sanguinea.** Dogwood. Hedges, not uncommon. Copt Hewick; Staveley; etc.

617. **Viscum album.** Mistletoe. Used to grow on a tree near Sleningford, which has been pointed out to the writer.

COROLLIFLORÆ.

610. **Adoxa moschatellina.** Moschatel. Woods and hedge-rows, common.

619. **Sambucus nigra.** Elder. Woods and hedges, common. In the "Swallow holes" near Hutton Conyers there are some very large elder-trees, one measuring some fifty-eight inches in circumference a yard from the ground.

620. **S. Ebulus.** Dwarf elder. Said to grow near Ripon commonly, and Dr. Lees records it ("West Yorkshire"). I never met with it except in a hedge near Leckby Carr.

621. **Viburnum Opulus.** Guelder rose. Not uncommon in woods; owing to the attacks of an insect it is often flowerless.

624. **Lonicera Periclymenum.** Honeysuckle. Woods and hedges, common.

625. **L. Xylosteum.** Shrubby honeysuckle. Dr. Lees records it from the Boroughbridge district ("West Yorkshire").

629. **Galium cruciatum.** Cross-wort. Woods and waste places, most abundant.

630. **G. verum.** Yellow bedstraw. Prefers dry situations, common.

632. **G. mollugo.** Great hedge bedstraw. Hedges, not very common. Tanfield; Sleningford; etc.

633. **G. saxatile.** Smooth heath bedstraw. Waste ground, not very common. Leckby Carr; Sharow mires; Swinton.

635. **G. palustre.** Water bedstraw. Wet places, common. Sharow mires; Hutton Moor; etc.

636. **G. uliginosum.** Rough marsh bedstraw. Marshes, etc., not common. Side of Ure towards Newby, in wet places; near Fountains (Mrs. Berkeley).

639. **G. Aparine.** Cleavers. Hedges, everywhere abundant.

641. **Asperula odorata.** Wood-ruff. Woods, common.

643. **Sherardia arvensis.** Field madder. Cornfields, moderately common.

645. **Valeriana dioica.** Marsh valerian. Not uncommon in wet meadows. Sharow mires; Marfield, Masham; fields on road to Galphay and near Clotherholme.

646. **V. officinalis.** Common valerian. Marshes and damp woods, pretty common.

648. **Valerianella olitoria.** Corn salad. Cornfields, not uncommon.

649. **V. dentata.** A cornfield alien. In a field near Leckby Carr (1881).

653. **Dipsacus pilosus.** Small teasel. "Fountains Abbey" (Rev. J. Dalton). Has lately been found under the rocks there by Miss Morton.

654. **Scabiosa succisa.** Devil's bit. Wet places, and woods. Marfield, Masham; very common at Hackfall; Sharow mires.

655. **S. columbaria.** Little scabious. Waste ground. Railway banks; by the Ure, etc.

656. **S. arvensis.** Field scabious. Fields and waste places, very common.

658. **Silybum Marianum.** Milk thistle. Hackfall district (Dr. Lees, "West Yorkshire").

659. **Carduus tenuiflorus.** Slender-flowered thistle. Dry waste ground, not uncommon.

660. **C. nutans.** Musk thistle. Pastures and waste ground, not uncommon.

661. **C. crispus.** Welted thistle. Waysides and waste places, common.

662. **C. lanceolatus.** Spear thistle. Pastures and waysides, abundant.

663. **C. eriophorus.** Woolly-headed thistle. Dry waste ground and pastures, not uncommon. Quarry-moor; Mackershaw, etc.

664. **C. palustris.** Marsh thistle. Damp shady places, not uncommon. Mackershaw and Studley woods; Hackfall; etc.

669. **C. arvensis.** Creeping thistle. Fields and waysides, very abundant.

671. **Carlina vulgaris.** Carline thistle. Not uncommon on higher ground. Meadows on the road to Galphay; hills near Masham; Quarry Moor.

672. **Arctium majus.** Burr-dock. Waste ground, not uncommon.

673. **A. minus.** Waste ground, common.

674. **A. intermedium.** Studley district (F. A. Lees, in Davis and Lees' "West Yorkshire").

678. **Centaurea nigra.** Black knapweed. Everywhere abundant.

679. **C. Scabiosa.** Greater knapweed. Not uncommon by roadsides, and by the R. Ure.

680. **C. cyanus.** Blue-bottle. An occasional corn-field alien.

684. **Chrysanthemum segetum.** Corn marigold. Occasional in cornfields. Leckby Carr, 1881; near Ripon same year (Mrs. Berkeley).

685. **C. Leucanthemum.** Ox-eye daisy. Common in all meadows and waste places.

686. **Matricaria Parthenium.** Feverfew. Waste places, not indigenous. Not uncommon near Sharow.

687. **M. inodora.** Corn feverfew. Fields and waysides, common.

689. **Tanacetum vulgare.** Tansy. Waste ground. Very common on Ure banks.

690. **Anthemis Cotula.** Stinking chamomile. Waste ground and roadsides, frequent.

691. **A. arvensis.** Corn chamomile. Cornfields, not uncommon. Hutton Moor and Bridge Hewick, 1881; Sharow, same year (Mrs. Berkeley).

694. **Achillea Millefolium.** Yarrow. Pastures and waysides, abundant.

695. **A. Ptarmica.** Sneeze-wort. Boggy meadows and woods. Sharow mires; not uncommon near Masham.

696. **Artemisia Absinthium.** Wormwood. Waste ground, generally near houses, rare. Near Littlethorpe; Kirby Hill (Baines).

697. **A. vulgaris.** Mug-wort. Woods and hedges, not uncommon. Very large and abundant at Sharow mires.

700. **Filago germanica.** Common cud-weed. Dry sandy places, preferring bare ground, not uncommon. Sandy cliffs near Sharow.

705. **Gnaphalium uliginosum.** Marsh cudweed. Damp places, uncommon. Hutton Moor.

707. **G. sylvaticum.** Wood cudweed. Woods and pastures, not common. Up the Laver above Clotherholme; near Tanfield.

711. **G. dioicum.** Cats-foot. Mountain pastures, rare. Only met with on the hills around Masham.

712. **Senecio vulgaris.** Groundsel. Waste ground, abundant.

713. **S. sylvaticus.** Mountain Groundsel. I never noticed this plant except near Swinton, Healey, and Masham.

716. **S. erucifolius.** Downy ragwort. Waste ground, not uncommon. Whitcliffe, 1880; Givendale, 1881. In the latter year Mrs. Berkeley found it at Fountains Hall, and near Knaresborough.

717. **S. Jacobæa.** Ragwort. Meadows and roadsides, very common.

718. **S. aquaticus.** Water ragwort. Common in marshy places. Sharow mires; Marfield, Masham; &c.

723. **Doronicum Pardalianches.** Leopard's bane. Copses, rare. Near Swinton (Baines); Marfield, Masham; Leckby Carr.

725. **Bidens cernua.** Bur-marigold. Watery places, rare. Ripon Common (Miss Morton) whence I have seen specimens, but the plant, from drainage, appears to be now extinct there.

734. **Bellis perennis.** Daisy. Everywhere abundant.

736. **Erigeron acris.** Blue flea-bane. Dry places on a calcareous soil. The only locality for this plant near Ripon, as far as I know, is Quarry Moor, where it is plentiful.

740. **Solidago Virga-aurea.** Golden rod. Woods and banks, a rare plant near Ripon. In Hackfall in small quantity; Wicliffe Lane, a few plants.

741. **Tussilago Farfara.** Colt's-foot. Arable land and stream sides, abundant.

742. **Petasites vulgaris.** Butter-burr. Stream sides, abundant.

743. **Eupatorium Cannabinum.** Hemp agrimony. Banks of streams and wet places, not uncommon.

744. **Cichorium Intybus.** Chicory. Railway banks near Tanfield (Mrs. Berkeley); one plant by the Ure, near Givendale, 1880.

745. **Lapsana communis.** Nipple-wort. Waste places and arable land, common.

748. **Hypochœris radicata.** Cat's-ear. Fields and waste ground, common.

751. **Leontodon hispidus.** Hairy hawk-bit. Fields and waste ground, pretty common.

752. **L. autumnalis.** Autumnal hawk-bit. Meadows and pastures, common.

755. **Tragopogon pratensis.** Yellow goat's beard. Meadows, common. Every plant that I have looked at near Ripon has been of var. *b.* (minor), in which the ligules fall short of the involucre.

757. **Taraxacum officinale.** Dandelion. A common weed. Var. *d.* (*palustre*), with light-coloured fruit and almost pinnatifid leaves, is not uncommon.

758. **Lactuca virosa.** Acrid lettuce. Lees records this from the Studley district ("West Yorkshire.")

761. **L. muralis.** Wall lettuce. Old walls and shady rocks. Very common on, and near, Fountains Abbey.

763. **Sonchus oleraceus.** Sow-thistle. Waste ground, abundant.

764. **S. asper.** Rough sow-thistle. Waste ground. Occasional near Leckby Carr, 1881.

765. **S. arvensis.** Corn sow-thistle. Cornfields, abundant.

770. **Crepis virens.** Smooth hawksbeard. Dry waste places, walls and banks, common.

773. **C. paludosa.** Succory-leaved hawksbeard. Damp woods. Near Studley (Baines); Mackershaw.

774. **Hieracium Pilosella.** Mouse-ear hawkweed. Dry banks and roadsides, common.

775. **H. aurantiacum.** Orange hawkweed. Originally a garden escape. Swinton, 1881 (Mrs. Berkeley).

795. **H. murorum.** Woods, walls, and rocks, not uncommon. Mackershaw; rocks at Knaresbro' (Baines); Hackfall, &c.

796. **H. cæsium.** (*H. sylvaticum* of Baines?). Recorded by Lees from Hackfall district, in "West Yorkshire."

799. **H. vulgatum.** Woods, uncommon. Mickley end of Hackfall; Mackershaw.

801. **H. gothicum.** Hackfall district (Lees, "West Yorkshire").

803. **H. prenanthoides.** Hackfall district (Lees, l.c.).

805. **H. umbellatum.** "In an old stone quarry called 'Blind Pit,' at Hutton, near Ripon" (Baines); still found there; found besides at Hackfall, whence Lees also records it (l.c.).

808. **H. boreale.** Woods and banks, occasional. Tanfield; Wath.

811. **Jasione montana.** Sheep's scabious. Fields and lanes, not uncommon. Hutton Moor; Masham; Quarry Moor, &c.

814. **Campanula glomerata.** Clustered bell-flower. Fields and stream sides, nowhere plentiful, but generally distributed.

816. **C. latifolia.** Giant bell-flower. Woods and shady places, common.

818. **C. rotundifolia.** Hair-bell. Walls, and dry banks, abundant.

822. **Specularia hybrida.** Corn bell-flower. Dry gravelly places. Gravel pit near Copgrove (Baines).

824. **Vaccinium Oxycoccus.** Cranberry. Bogs. In some abundance at Leckby Carr; Whitemere, on Hutton Moor.

827. **V. Myrtillus.** Bilberry. Woods. Hackfall; Mackershaw; Plumpton rocks; Spa Gill (Mrs. Berkeley).

836. **Erica Tetralix.** Cross-leaved heath. Leckby Carr; Hutton Moor; near Masham; Swinton, &c.

837. **E. cinerea.** Common heath. Leckby Carr; Hutton Moor; near Masham; Swinton, &c.

840. **Calluna vulgaris.** Ling. Leckby Carr; Hutton Moor; near Masham; Swinton, &c.

841. **Pyrola rotundifolia.** "Near the water-fall at Lord Grantley's Lakes on Sawley Moor" (Brunton). This, if still existing, will very likely prove to be 842.

842. **P. media.** "Hackfall and Studley woods" (Winch); has not been seen of late years.

843. **P. minor.** Lesser winter green. Hackfall, near Mickley; Mackershaw (rare, but undoubted *P. minor*).

847. **Fraxinus excelsior.** Ash. Woods and hedges, common.

848. **Ligustrum vulgare.** Privet. Woods and hedges. Near Sharow (introduced); Mackershaw (has the appearance of being planted here also, as game-covert); Hackfall, in small quantity.

850. **Vinca minor.** Lesser periwinkle. Woods and banks, rare. Tanfield, near *Helleborus viridis*; Sawley and Grantley woods (Plues).

853. **Erythræa centaurium.** Centaury. Fields, not very common. Thieves Gill; Quarry Moor; Mackershaw.

857. **Chlora perfoliata.** Yellow wort. Fields and banks, local. Quarry Moor; Whitcliffe; in large quantity (1881) in a field near Thieves Gill.

858. **Gentiana pneumonanthe.** Marsh gentian. Bogs. Leckby Carr (Plues et al.); Pillmoor.

861. **G. amarella.** Autumn gentian. Calcareous fields, not uncommon. At Quarry Moor this plant may be found with four- or five-cleft calyx and corolla, and the lobes of the latter sometimes equal and sometimes unequal; these points are the distinguishing features between this plant and the next, but at Quarry Moor, you may find four-cleft corolla with four-cleft unequal calyx, four-cleft corolla with five-cleft calyx, and five-cleft corolla with five-cleft regular calyx, and even find two of these forms of flower (and that, forms numbers one and three), actually growing on the same plant. Whether these are hybrids, or whether 861 and 862 are extreme forms of one species, I leave it to more learned botanists to settle, merely contenting myself with recording facts which anyone may verify for himself.

862. **G. campestris.** Field gentian. Wicliffe Wood (Plues); abundant in a field near Thieves' Gill.

863. **Menyanthes trifoliata.** Bog-bean. Bogs and ditches, local. Swinton (Mrs. Berkeley); Marfield, Masham; Leckby Carr; Whitemere; Hutton Moor.

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7. *Went Vale*—Went Bridge, J.W.
12. *Lower Calder*—Canal at Heath Bridge near Wakefield, a few specimens, J.W.

Mr. J. Emmet has recently informed us that the var. *depressa* occurs with the type at Boston Spa, and also confirms the York record.

Var. **subcylindrica** Jeffr.

6. *Trent*—Conisborough, 1873, J.W.
7. *Went Vale*—River Went near Ackworth, J.H.
11. *Upper Calder*—Reservoir near Halifax, 1872, J.W.
12. *Lower Calder*—Canal, Heath Bridge, Wakefield, J.W.
13. *Airedale*—Canal at Saltaire, 1873, J.W.

Var. **acuminata** Jeffr.

3. *Vale of York*—Foss Drift, Hugh Richardson.
24. *Holderness*—In the drift, Beverley Beck, in the Beverley and Barmston Drain, and at Figham, J.D.B.

Var. **pusilla** Müll.

Shell smaller, with 4 to 4½ whorls, diam. 4 mill., alt. 4 mill.

7. *Went Vale*—A single specimen amongst a few sent to us from Hemsworth dam, by Mr. Hugh Richardson.

Var. **albina** Taylor.

7. *Went Vale*—Mr. Wilcock has found whitish specimens approaching this variety at Went Bridge, in 1863, and at intervals since.

Mr. Wilcock has found somewhat scalariform monstrosities at Wentbridge, 1869; near Halifax, 1872, Heath Bridge near Wakefield, 1872; and New Miller Dam, 1874.

——:o:——

Valvata cristata (Müller).

Abundant, but very local.

This species appears to have three areas of distribution, all in the eastern half of the county, corresponding to the low-

lying alluvial plains of the three river systems: the Ouse and its tributaries in the centre, the Tees in the north, and the Hull in the south-east.

It is found in great abundance in a subfossil state in the mud cliffs at Hornsea, and is thrown up by the moles in the neighbourhood of Askern, testifying to its former occurrence in those places.

The egg capsules of this species are very peculiar, resembling small curved spines projecting perpendicularly from the leaf upon which they rest. The number of eggs in each capsule is variable, but a greater number than eight has not been noticed. They are arranged in a single series, and are of a reddish colour.

3. *Vale of York*—Generally distributed in ponds in the Ainsty, F. G. Binnie; pond at Church Fenton, J.D. ! pond near Healaugh Hall, Tadcaster, F. G. Binnie; in profusion in Askham Bog, and greatly on the increase there, W. C. Hey! pretty common in the River Foss and the small stream running into it, R.M.C.; a few in the River Ouse drift, R.M.C.; one at South Milford, in 1879 ! Boston Spa, J. Emmet.

4. *Humber*—Canal near Burton Hall ! ditch at Barlow Common, Selby ! abundant, but very thickly encrusted, amongst decaying vegetation in a ditch near to and in the canal at Selby !

7. *Went Vale*—A few in the River Went, attached to a caddis case, C.A.; a few on caddis cases in Went dyke, 1865, between Ackworth and Went Bridge, J.W.; Askern, H.S. ! Ackworth School Canal, but not found in such numbers since it was cleaned out; empty shells formerly found in mud turned out of mill stream in 1879, H. Richardson; Campsall Park, L.P.; large numbers in dykes on both sides of the road between Smeaton and Campsall, J.W.

20. *Lower Tees*—In ditches at Great Ayton, J. W. Watson. Seems to be of rare occurrence in this district; I have taken one or two specimens at odd times in the fish pond at Kirkleatham near Redcar, and Mr. J. W. Watson informs me it used to be common in many of the ponds near Gt. Ayton. I however have not been able to confirm this up to the present time.—Baker Hudson.

22. *Upper Derwent*—It appears in the late Mr. Bean's list of Scarborough shells: not found by Mr. J. H. Ashford.

23. *Chalk Wolds* — Leckonfield Moat, J.D.B.; Bridlington, common attached to caddis cases in a pond near railway on west side of line to Scarborough, April 12, 1884, G. Wingate!

24. *Holderness*—On caddis cases in the Leven canal, J.D.B.; also in the Drift, Beverley Beck, J.D.B.

Rectification of Districts.

We take the opportunity of stating that while the system of districts adopted at the commencement of our work has been practically satisfactory, the line separating the Chalk Wolds and Holderness has not been so nearly coincident with the physical features as could be wished. For the future the line of railway from Hull to Driffield and Bridlington will be adopted in place of the river Hull, thus throwing a number of records from the low-lying country on the right bank of that river into the district with which they have most affinity.

We propose also to separate the records given for district No. 18, or Swaledale, by detaching—by means of the railway from Melmerby to Dalton Junction—the low-lying country of which Thirsk is the centre; this district we shall describe as 18a Vale of Mowbray.

Order PULMONOBRANCHIATA.

Family LIMNÆIDÆ.

Dr. Gould, in his 'Report on the Invertebrata of Massachusetts,' says: 'From the fact of my finding young individuals only in the spring and numerous dead full-grown shells during the late autumn and winter, I presume they arrive at maturity during one season.' This scarcely accords with our experience of this family, as we have generally found them full-grown in summer, and in many cases in spring, and have only found young and immature specimens in autumn.

The Limnæidæ begin to deposit their spawn during the early part of March, and continue throughout the whole of the

spring, the greater part of the old ones dying off before July, and in many cases before June, or even May.

Several of the species are found in a subfossil state in the mud cliffs at Hornsea, and in a deposit which has evidently been formed on the bed of an ancient lake at Askern.

——:o:——

Genus PLANORBIS Guettard.

Dr. Jeffreys and Prof. Tate state that this genus has the remarkable peculiarity of voluntarily emitting a purple fluid on being irritated, this being considered a mode of defence against their enemies, analogous to that of the Aplysia, stating that the liquid is secreted by glands at the side of the neck.

Professor Ray Lankester has however pointed out ('Zool. Anzeiger,' p. 343, 1884), that the fluid is under no circumstances shed from the body of these animals unless the surface be wounded.

The aquiferous pores said to exist in the foot for the admission of water to the blood-system, are denied by Prof. Lankester to have any existence in fact. The expansion of the foot would appear to be caused by a rapid flow of blood from other parts of the body.

The foot is short. The animals of this genus, when kept in an aquarium, as well as naturally in ponds, are fond of crawling out of the water, also of floating on the under surface of the water, and possess the power of making mucous threads, along which they occasionally travel.

The species of this genus do not appear in Yorkshire to inhabit to any extent the Western dales of our county, and Mr. J. S. Harper, of Sedbergh, informs us that no species of the genus is found in that neighbourhood.

——:o:——

Subgenus SEGMENTINA Fleming.

Shell orbicular, depressed, furnished with transverse testaceous partitions or teeth. Aperture transversely oval or circular ('Adams' Genera of Recent Mollusca,' vol. ii. p. 264).

Planorbis lineatus Walker.

Abundant, but extremely local.

So far as is at present known, this species in Yorkshire only occurs in one or two localities round York and in one in Holderness. Askham (or more correctly speaking, Dringhouses) Bog is its great stronghold, and here it is in great abundance. On Strensall Common it occurs but only sparingly. A few are said to have been found in Hobmoor ponds, while in 1855 a few were found in the Tillmire ponds, and in 1859 in the direction of Osbaldwick, all these places being in the immediate vicinity of the city of York. Mr. R. M. Christy, who collected round about York with great assiduity for some years, informs us that he himself has not met with the species elsewhere than at Askham, where in some ponds it abounds, whilst in others there are scarcely any at all.

In its habitat this species differs from *Planorbis nitidus*, which prefers living among decaying leaves in stagnant pools ; *P. lineatus* by preference inhabits clearer and shallower ponds where there is grass growing, and even when its pond is slightly flooded Mr Christy's experience is that it will come up into the flooded grassy margin.

The Yorkshire localities are interesting on account of being the most northerly habitat in Britain and forming an entirely detached outlier, the nearest known locality being the neighbourhood of Norwich.

Lovell Reeve mentions that it has been found in the south of Scotland, but this observation has not been confirmed.

A highly polished yellow variety is plentiful in freshwater streams near Melbourne, Australia, according to Mr W. F. Petterd, of Launceston.

Dr. Jeffreys states that it lays only from three to eight eggs, but we are inclined to think that these are the numbers in a single capsule, of which in all probability several are laid in the

course of the season. The septa are formed in immature individuals and are not a characteristic of adult specimens only, as stated by some authors.

Mr. Sheriff Tye, in his article upon mucous threads, denies this species the power of making them, on account of its inhabiting running streams. In Yorkshire this bar to the exercise of the power does not exist, as the habitat in all cases is still pools.

3. ***Vale of York***—Dringhouses Bog, in profusion, W. C. Hey and others! This locality is sometimes, but not quite accurately, referred to as 'Askham Bog.' Tillmire ponds, a few in 1855, R.M.C.; near Osbaldwick, 1859, R.M.C.; Hobmoor ponds, a few formerly, R.M.C.; Strensall Common, sparingly, W.C. Hey; pond at Copmanthorpe, J. Emmet.

24. ***Holderness***—Hornsea Mere, common, J.D.B. and W.D.R.!

Subgenus GYRAULUS Agassiz.

Shell orbicular above, flat beneath; whorls few, rapidly increasing (Adams' 'Genera of Recent Mollusca,' ii. p. 263).

Planorbis nitidus (Müll.).

P. fragilis Mousson.

Local and not common.

The *P. fragilis* of Mousson is considered by Moquin-Tandon to be a pale, thin variety of this species.

The keel in the normal form is situate at or near the middle of the shell, but Mr. Nelson has met with specimens at Birmingham with the keel at the lower or basal edge as in *Planorbis complanatus*.

It is closely allied to *P. exacutus* of Say, a species inhabiting North America.

The distribution of this species in Yorkshire is mainly confined to the central and southern parts of the county, the only exceptions being the four stations on the eastern coast.

Mr. Borrer has remarked that this species has a preference for *Callitriche verna* in clear water; other observers give as its favourite habitat the decaying leaves in stagnant pools.

Rev. W. C. Hey has collected this species in company with *P. lineatus* at Dringhouses, and Mr. Roebuck has also found them associated at Hornsea Mere. The fact of their occasionally living in company was not known to Dr. Jeffreys.

3. ***Vale of York***—Rare in the York district; R.M.C. has found it, but not common, in the Foss, and in one pond at Hobmoor, and Mr. C. Wakefield has some he says he obtained from Askham, R.M.C.; Askham Bog, one specimen, July 1875, W. E. Brown; Dringhouses Bog, in company with *P. lineatus*, W. C. Hey; ponds near Healaugh and Bilbrough, F. G. Binnie; pond, Aketon near Spofforth! Asp ponds, Knaresborough! Boroughbridge, J. Wilcock; Sherburn, 1870, G. Roberts.

4. ***Humber***—Fryston Hall Fish-pond, July 1st, 1871, Geo. Roberts and J. W.; pond, Camblesforth! canal near Burton Hall!

7. ***Went Vale***—At Ackworth this species was common in an old roadside fish-pond among duckweed a year or two ago, then nearly disappeared, but has again increased, C.A. (1854); Hessle! Hemsworth, J.H.; one specimen in the Went, W. E. Brown; pond by Hessle Farm near Ackworth, in June 1883, H. Richardson; a few, associated with *P. nautileus*, in a small pond on the right of the road from Ackworth to Bracken Common, G. F. Linney; associated with *P. albus* in Colonel Vincent's pond, Ackworth, G. F. Linney; South Elmsall, 1875, J.W.; the pool at Askern, 1879, J.W.; river Went, between Campsall and Askern, J.W.

8. ***Dearne***—Bretton Park, common, W.D.R.!

10. ***Colne***—Canal near Huddersfield, J.Wh.; Deighton, common, J.Wh.

11. ***Upper Calder***—Luddenden Valley, J.C., 1875.

12. ***Lower Calder***—Kirkthorpe, J.H.! pond between Crofton and Nostel, 1869, J.W.; Barnsley canal, several, J.W.

13. ***Airedale***—Canal at New Wortley, H.S.! goit at Meanwood, one specimen, H.S.! stream in Goodman-street, Hunslet, 1861, now built over!

20. ***Lower Tees***—Occurs plentifully in a small pond at Acklam, near Middlesbrough, B. Hudson.

22. ***Upper Derwent***—Pond in 'Plantation,' Scarborough, C.A.

23. ***Chalk Wolds***—Bridlington, W. C. Hey; Bridlington, common attached to caddis cases in a pond near railway, west side of line to Scarborough, April 12th, 1884, G. Wingate! sparingly in Leckonfield Moat, J.D.B.!

24. ***Holderness***—Hornsea Mere, J.D.B.!

Var. **albida** Nelson.

20. *Lower Tees*—A fine specimen in the fish-pond, Acklam, near Middlesbrough, in the early part of 1883, with the type, B. Hudson.

——:-o-:——

Planorbis nautileus (L.).

Widely distributed and common.

This species seems to be pretty well diffused through the low-lying country in suitable places. It is usually abundant where it occurs, adhering to *Anacharis* and other plants.

It is a favourite shell with some kinds of caddis-worms for attaching to their cases, Mr. R. M. Christy has some from Scarborough completely covered by a hundred or more specimens.

The var. *crista* is usually found with the type, of which it is generally considered to be merely an immature form.

Mr. Wilcock, of Wakefield, one of our most assiduous and successful collectors, has found distorted specimens in several localities in the county, but does not specify the precise places.

3. *Vale of York*—Abundant in some ponds at Askham and Hobmoor, rare in the Foss, and very probably in some other places, but its small size renders it difficult of discovery, R.M.C.; Ouse drift, H. Richardson; very plentiful along with *Sphærium lacustre* in a pond near Bootham Stray, York, H. Richardson; ponds near York, W. C. Hey; ponds near Tadcaster, F. G. Binnie; Sherburn, 1870, G. Roberts; Knaresborough, J.W.; pond near Jackson's Wood, Wetherby, F. G. Binnie; pond between Wetherby and Walton, possibly the same place as preceding, J. Emmet; ditch near Ouse, below York, in 1868, R. Whitwell! Strensall Common, W. C. Hey.

4. *Humber*—Fryston Park, H.P.! Castleford, Geo. Roberts; Milford, 1875, G. Roberts; Selby, J.W.; Drax, J.W.; Goole, J.W.

6. *Trent*—Conisborough, J.W.; Doncaster, J.W.

7. *Went Vale*—*P. imbricatus* at Ackworth, not common, found with *Ancylus lacustris*, C.A. (1854); Ackworth, extremely abundant in various ponds, C.A. (1874); Campsall lake, E. Lankester, 1842, and J.W., 1875; Hemsworth, J.W.; Went Bridge, J.W.; Nostel,

J.W.; Pontefract, J.W.; Askern, J.W.; very abundant at the brick ponds, Ackworth, on *Chara*, W. E. Brown! and in a small pond on the road to Bracken common associated with *P. nitidus*, W. E. Brown.

8. ***Dearne***—Bretton Park, J.W.; several places near Barnsley, J.W.

11. ***Upper Calder***—Near Hebden Bridge, in the old pits, on the weeds, D. Dyson's Manchester List, 1850, p. 70.

12. ***Lower Calder***—Newton, near Wakefield, J.W.! Ossett, common, J.H.; Cold Hiendley, common, J.H.; Wakefield, J.H.; Stanley, Geo. Roberts; Outwood, Geo. Roberts; New Miller Dam, J.W.; Alverthorpe, J.W.; Coxley Valley, J.W.; Batley, J.W.; Crofton Park fish-pond, J.W.; Barnsley canal, J.W.; Altofts, J.W.; Normanton, J.W.

13. ***Airedale***—Pond at Temple View, York Road, Leeds, very plentiful! pond, Black Hills, Leeds! pond near Osmondthorpe Hall, Leeds! pond in Osmondthorpe Lane, Leeds, formerly common, not found in 1868! pond, Horse Shoe Lane, Leeds, H.S.! pond at Roundhay Grange! Calcoates Lane, Leeds, common, H.S.! pond in lane between Seacroft and Scarcroft, the only species found! pond near Seacroft Hall, associated with *Pisidium pusillum* and *Limnæa peregra*! pond, Oak-tree Farm, Harehills-lane, Leeds! Scholes, near Leeds! pond, Roundhay Limehills! Oulton, J.W.; Bingley, J.W.; canal, Saltaire, J.W.

16. ***Nidderdale***—Pannal, J.W.

17. ***Wensleydale***—West Tanfield! pond at Grewelthorpe, April, 1880! Skelton near Ripon!

18*a*. ***Vale of Mowbray***—Vale of Mowbray, W. Grainge, 1859.

20. ***Lower Tees***—Ditches near Middlesbrough, W.H.B.; near Middlesbrough, J. W. Watson; Coatham Marshes, where it is abundant on *Lemna minor* in a pond, the usual ridges imperfectly developed, C.A.; abundant in fish-pond at Kirkleatham, near Redcar, B. Hudson.

21. ***Eskdale***—On the coast near Whitby, J.W. and G.R.

22. ***Upper Derwent***—Scarborough, R.M.C. and J.W.

24. ***Holderness***—Hornsea Mere, J.D.B.; pond near Springhead, Hull, abundant, 1881, J.D.B.; ditch bordering Swinemoor near Beverley, J.D.B.

Var. crista (L.).

We have adopted Linné's name *crista* to distinguish this variety, in preference to the more recent one *cristata* of Draparnaud.

3. ***Vale of York***—Askham Bog, W. C. Hey; Tadcaster, rarer than type, F. G. Binnie.

7. *Went Vale*—Ackworth, common, with type, C.A.
12. *Lower Calder*—Ossett and Cold Hiendley, occurring with the type, J.W.
13. *Airedale*—Pond, Oak Tree Farm, Horse Shoe Lane, Leeds! pond, Osmondthorpe, rather common! Roundhay Grange, very plentiful and characteristic, J. Abbott!
17. *Wensleydale*—Skelton near Ripon!
24. *Holderness*—Ditch bordering Swinemoor, Beverley, with the type, abundant, J.D.B.; pond near Springhead, Hull, J.D.B.

——:-o-:——

Planorbis albus Müll.

Planorbis hirsutus Gould!

Common and widely distributed.

This is more widely dispersed in Yorkshire than any other species of the genus, having been reported from nineteen of the twenty-four districts into which the county is divided.

Its northern limit in Britain is given by Dr. Jeffreys as Aberdeen, but it has since been found in the extreme north of Scotland, at the Lake of Brickigo, Caithness.

Planorbis hirsutus of Gould, a native of North America, is considered by Dr. Jeffreys to be identical with the present species, and it is closely represented in South America, according to Hermann Jordan, by *Planorbis Pfeifferi* of Strobel, a species inhabiting the Argentine Republic.

According to the observations of Mr. Borrer, this species is found in ponds on the clay, and not in those situate on the chalk or sand.

3. *Vale of York*—Not common in the York district, most so if anywhere in the Foss; in some ponds at Strensall Common; in Osbaldwick direction about 1859; Askham; Hobmoor, R.M.C.; Clifton Ings, York, W. C. Hey; Hobmoor ponds, W. C. Hey; Tadcaster, F. G. Binnie; Strensall! Woodhall Bridge near Wetherby! Malton, 1880, J.D.B.; stream at Scarcroft, W.D.R.! frequent at Collingham and Boston Spa, J. Emmet.
4. *Humber*—Carlton pond near Snaith, abundant, W.D.R.! ditch near canal, Gateforth! canal near Burton Hall!
5. *Hatfield and Thorne*—Auckley Common, May 14, 1883!

6. *Trent*—Pond near Sandbeck Park gates, a few, W.D.R.!

7. *Went Vale*—Hemsworth Dam, good specimens, C.A., 1854; common throughout Ackworth district, fine in Hemsworth reservoir, C.A., 1874; on the weeds, W. E. Brown; Askern, H.S.! Norton, one! Hessle! Colonel Vincent's pond, Ackworth, associated with *P. nitidus*, G. F. Linney; Nostel, H. Richardson.

8. *Dearne*—Canal at Royston! Bretton Park, common, W.D.R.! Worsborough, H.C.!

10. *Colne*—Mill-dam, Deighton, J.Wh.; Huddersfield, not uncommon in the canal and in stagnant ditches, G. H. Parke, 1868.

11. *Upper Calder*—Luddenden Valley, J.C., 1875.

12. *Lower Calder*—Sandal, G.T.! Woodkirk, Geo. Roberts; various places round Wakefield, J. H., 1874; Wintersett reservoir, W. E. Brown.

13. *Airedale*—Roundhay, common in Waterloo Lake! Mill goit at Adel! common in stream at Meanwood! Waterloo, H.S.! stream near Shepherd's pond, Sheepscar! Swillington! Halton! Killingbeck, common! Thorp Hall pastures, one! Newsam Green near Woodlesford, common, H.S.; canal at New Wortley, H.S.; and at Calverley, H.S.! ditch beside river at Calverley Bridge! canal at Saltaire, common, W. West! Micklethwaite, near Bingley! Roundhay Grange! Allerton Ings, scarce!

14. *Malhamdale*—Skipton!

16. *Nidderdale*—Hartwith high and low dams, near Birstwith, and Ripley Beck, F. T. Walker!

17. *Wensleydale*—Ponds at Staveley! pond at Grewelthorpe! pond at North Stainley! West Tanfield, several! Whitfield Gill, near Askrigg, one, W.D.R.!

18*a*. *Vale of Mowbray*—Pond between Kilvington and Feliskirk, J. H. Davies, 1855.

20. *Lower Tees*—Ditches near Great Ayton, J. W. Watson; fine, but not abundant, in fish-pond at Kirkleatham near Redcar, B. Hudson.

22. *Upper Derwent*—Scarborough Castle Hill, W. C. Hey.

23. *Chalk Wolds*—Very fine in a pond close to the precipice of Bempton Cliffs, 430 feet alt., W. C. Hey; Welton Dale, near Brough, J.D.B.; Londesborough, 1880, J.D.B.

24. *Holderness*—Leven canal, J.D.B.; Hornsea Mere, J.D.B.; drift of Beverley Beck, moderately plentiful, J.D.B.; Beverley and Barmston Drain, J.D.B.; Swinemoor, near Beverley, J.D.B.

Var **Draparnaldi** (Shepp.).

Planorbis deflectus Say.
Planorbis virens Adams.
Planorbis obliquus De Kay.

Dr. Jeffreys considers *Planorbis deflectus* of Say as referable to this variety: the *Planorbis virens* Adams, and *Planorbis*

obliquus De Kay are considered synonymous with *P. deflectus*, by Mr. Binney.

12. ***Lower Calder***—Very fine in a pond at Sandal near Wakefield, J.H. !

——:-o-:——

Planorbis parvus Say.

Planorbis vermicularis Gould !
Planorbis glaber Jeffreys !
Planorbis concavus Anthony.
Planorbis elevatus Adams.
Planorbis cupæcola Von Gall.
Planorbis Moquini Req.
Planorbis regularis Hartm.

Very local, but widely diffused.

This species must now be known as *Planorbis parvus* Say, instead of *P. glaber* Jeff., by which name it has been so generally known in England. Dr. Jeffreys himself acknowledged that the two names represent the same species. We add to the synonymy the *P. vermicularis* of Gould, of which species we have received specimens from Oregon, undistinguishable from our English examples of *P. glaber*. Mr. Binney places *P. concavus* Anthony, and *P. elevatus* Adams as synonyms of *P. parvus*. Dr. Kobelt adds *P. cupæcola* Von Gall., and *P. Moquini* Requien ; and Prof. E. v. Martens has in addition *P. regularis* Hartmann.

7. ***Went Vale***—*Planorbis lævis* is found in a small fish-pond at Ackworth, and although almost the whole district for two or three miles round—and in some directions for five miles—has been diligently explored, they have not been found in any other pond in the neighbourhood, although they are there particularly abundant ; but no other shell is to be found with them, except a few *Limnæa peregra*, J. W. Watson, Nat., 1854, p. 57 ; Ackworth, abundant in one small depopulated fish-pond, adhering to *Potamogeton crispus* ; some strange monstrosities occur, C.A., Nat., 1854 ; abundant in a fish-pond in Ackworth Park, and there only, C.A., 1874 ; Ackworth ! a few specimens in a pond on the right hand side of the road past Wakefield quarry, near Nostel, W. E. Brown ; a few in dykes on both sides of the road between Smeaton and Campsall, J.W. ; in Hepworth's pond near Low Ackworth, G. F. Linney.

17. *Wensleydale*—Whitfield Gill near Askrigg, a single specimen picked out of moss, W.D.R. !

20. *Lower Tees*—Ponds near Great Ayton, J. W. Watson.

Subgenus GYRORBIS Agassiz.

Shell very flat, more or less carinate, not umbilicated, smooth, whorls progressively increasing, the last not much larger than the penultimate ; aperture sub-oval, more or less angulated (Moquin-Tandon, 'Hist. Nat. d. Mollusq. terr. et fluv. de France,' ii, p. 428).

Planorbis spirorbis Müll.

Planorbis Dazuri Mörch.
Planorbis rotundatus Poiret.

Widely distributed.

According to Kobelt and Jordan *Planorbis Dazuri* of Mörch is identical with this species. Its northern limit in Britain is given by Dr. Jeffreys as the Moray Firth district. Its range has now been extended to Caithness, Mr. Peach having found specimens at Reiss and near Thrumster.

This species is known on the Continent as *Planorbis rotundatus* Poiret, the name *spirorbis* being applied to Jeffreys' variety *ecarinata*, which is considered a distinct species.

It is probably the most widely diffused species of Planorbis in Yorkshire, being found not only in the ditches, ponds, &c. on the plains, but extending its range up some of the western dales. At Malham Moss, on a plateau 1300 feet above sea level, it lives in company with *Limnæa truncatula*, *Succinea elegans*, etc.

It is recorded from North Australia by Mr. E. A. Smith, who found two series thus labelled in the Cumingian collection.

We have noticed that this species often lives in association with *Limnæa glabra* and *Physa hypnorum*, the same conditions appearing to be favourable to all three species. This fact has been confirmed by other observers.

Dr. Martin Lister, in his 'Historiæ Animalium Angliæ,' published in 1678, gives at p. 145 several Yorkshire localities for this species, which we give under the several districts.

3. ***Vale of York***—I have found it at different times in stagnant waters round York, and in great plenty in the ditches by the river Derwent near Bubwith Ferry, Dr. Martin Lister, 1678; teems in Askham Bog, W. C. Hey; in profusion in all ponds round York, W. C. Hey, 1879; near Knavesmire! ditch, Huntington near York! general and abundant about York, particularly in the many small ponds in the corners of fields near Bootham Junction Signal-box, R.M.C.; Bootham Stray! pond near Dringhouses! Bishopthorpe! Towton! ditch, Woodhall Bridge near Wetherby! Sicklinghall, numerous! stream opposite the Bishop Dyke near Sherburn! Streethouses near Tadcaster! ditch at Wetherby, associated with *Physa hypnorum*! pond at Wetherby, J. Emmet; Newton Kyme, H.C.! ditch near Tadcaster! abundant in roadside ditches east of Brafferton, W.D.R.! Biggin! Wetherby, common, W.D.R.! Wighill, F. G. Binnie; Ferrensby near Knaresborough! Minskip near Boroughbridge! Strensall Common! common in dykes at Church Fenton and Ryther, H.P.

4. ***Humber***—Ditch, Ermine-street near Castleford, associated with *Limnæa glabra* and *Physa hypnorum*! Swinefleet! ditch, Barlow Common near Selby! dyke by the river side, Carlton near Snaith! pond at Camblesforth! Goole, W.D.R.! ditch, Burton Salmon! Breighton near Wressle, J.D.B.; Ferrybridge, J.W.; Knottingley, J.W.; ditch by the railway, Milford!

5. ***Hatfield and Thorne***—Pond near Doncaster! ditches near Blaxton Grange, common, May 14, 1883! abundant in roadside ditches, Sampson's Lane, Hatfield Chase, April 14, 1883, W.D.R.!

6. ***Trent***—Rather frequent in the ditches and marshes called Pottery Carr, Dr. Martin Lister, 1678; Conisborough, J.W.

7. ***Went Vale***—Pollington! Ackworth, common in stagnant pools, C.A., 1854; in Hepworth's pond near Low Ackworth, G. F. Linney; Hessle Green near Ackworth, March 19, 1882! near Plantation, Ackworth, H. Richardson! Hessle near Ackworth, H. Richardson! Askern, H.S.! moss near Askern! mole hills, Askern! ditch near Balne Moor, September, 1877! ditches in Cowick Park, W.D.R.! a few specimens in a pond on right hand side of road past Wakefield quarry, G. F. Linney; Nostell, 1864, J.W.; Campsall Park pond, 1865-83, J.W.; Went Bridge, J.W.; Smeaton, J.W.

8. ***Dearne***—Canal at Royston, March 29, 1868! Worsborough, H.C.! Cudworth, in dykes, J.W.; Darton, J.W.; Bretton Hall, J.W.

9. ***Don***—Ingbirchworth reservoir, J.W.

10. ***Colne***—Canal near Huddersfield!

12. *Lower Calder*—Canal near Wakefield, H.P.! ditches near Cold Hiendley reservoir, March 29, 1868! Newton near Wakefield, J.W.! Cold Hiendley reservoir! Common throughout the Wakefield district, J.H., 1874; Thorne's House fish pond, 1882, J.W.; St. Swithin's Wood dykes, J.W.; Stanley, J.W.; Altofts, 1872, J.W.; New Miller Dam, J.W.

13. *Airedale*—Halton, 1871! common within a dozen miles of Lofthouse, Geo. Roberts; Methley. a few, Dec. 1882. H. L. Oxley! canal, Calverley! Oulton, J.W.; Methley, J.W.

14. *Malhamdale*—Common in marsh by the side of Malham Tarn, 1,300 feet above sea level, W. West!

15. *Wharfedale*—Ditch near Otley, H.S.; Drygill, 1882, Geo. Roberts; stream near Starbotton, one, dead, August 24, 1882, W.D.R.! numerous in roadside ditches at Linton near Grassington, August 7, 1882, H. T. Soppitt! Grassington, H. T. Soppitt; in a small pond on the roadside near Pool!

18*a*. *Vale of Mowbray*—Amongst Equiseta in a pond between Gormire and Whitsuncliffe, and in the ditch on the roadside between Thirsk and Topcliffe, J. H. Davies, Thirsk list, 1855.

20. *Lower Tees*—General in the Lower Tees district, J. W. Watson, 1881; several waters near Roseberry in Cleveland, C.A., 1879; common in stells on Coatham marshes near Redcar, and in a pond near Acklam, Baker Hudson.

22. *Upper Derwent*—Pond near Cayton Bay, associated with *Pisidium cinereum*! abundant in a pond south of Scalby Bridge, July 1, 1882, W.D.R.! Scarborough, several, R.M.C.! Flamborough Head, W. C. Hey.

23. *Chalk Wolds*—Hessle near Hull, J.D.B.! Hessle-road, Hull, J.D.B.; associated with *Limnæa glabra* and a few *L. peregra* in a small but deep pond near Leckonfield Moat, in which the vegetation is mainly *Ranunculus*, J.D.B., 1881; Burlington, J.S.G.; Filey, J.D.B.! Bridlington, débris, a quantity, C. T. Musson! Speeton undercliff, abundant in pools, May 21, 1883! Anlaby Road, Hull, J.D.B.

24. *Holderness*—Ditch near Hornsea! Meaux, and New Holland near Meaux, May 29, 1882, W.D.R.! ditch in a field near Wassand, plentiful, J.D.B., 1880; Skipsea! common about Hull: in some parts of Spring Dyke the water is quite brown with their floating shells, J.D.B.; Figham near Beverley, May 29, 1882, W.D.R.! abundant at Swinemoor, drift of Beverley Beck, Long-lane and Kitchen-lane, all near Beverley, J.D.B., 1882; Wansford, L.B. Ross.

Var. ecarinata Jeff.

Planorbis spirorbis Müll., of Continental Authors.

This form is considered a distinct species by continental conchologists; it differs from the type in the absence of any keel

or angularity and in having fewer whorls. The colour character added by Dr. Jeffreys is only of subsidiary importance.

12. *Lower Calder*—Dirtcar (Hebden).

Var. albida Nelson.

Mr. Wilcock informs us that the specimens upon which the variety was founded were from St. Swithin's Wood near Stanley, and not from Newton as stated by Mr. Nelson, J.C., iv., p. 25.

12. *Lower Calder*—Dirtcar, J.H., 1874; Newton near Wakefield, J.H.; St. Swithin's Wood near Stanley, J.W.!

Monst. scalariforme

23. *Chalk Wolds*—Flamborough Head, W. C. Hey, 1879.

Mr. Wilcock has found some very curiously contorted specimens at Altofts near Normanton.

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Planorbis vortex (L.).

Common and widely distributed.

This species, though widely diffused, is not so universally common as *P. spirorbis*, and does not range quite so far north.

In Yorkshire it is also less common, and its known localities are not so numerous.

Mr. Lionel Adams remarks that this species is less liable than the preceding to disfigurement of the epidermis when living under similar conditions in the same pond.

2. *Lune and Ribble*—Common in a pond by the side of the Ribble at Gisburn, Ap. 18, 1881, W.D.R.!

3. *Vale of York*—Milford! pond near Church Fenton Station! pond at Riccall! Wetherby, 1877, E. E. Prince! a number of dead specimens in a ditch at Little Fenton, June 21, 1875! Clifton Ings, R.M.C.; pond by the Foss, York, R.M.C.; Strensall Common! Bubwith, J.D.B.; Boston Spa and neighbourhood of Tadcaster, J. Emmet.

ON SOME PROBABLE CAUSES OF A TENDENCY TO MELANIC VARIATION IN LEPIDOPTERA OF HIGH LATITUDES.

By the Rt. Hon. LORD WALSINGHAM, M.A. ;

being the annual address of the president to the members of the yorkshire naturalists' union, at doncaster, march 3rd, 1885.

Those of you who have taken any interest in the study of Lepidoptera are well aware that in the course of the last four years some very interesting collections have been made in the most northern parts of the British Islands. Since the rapid increase in the number of our collectors has rendered the capture of a species new to our lists a very rare occurrence, greater attention has been devoted to the geographical distribution and local variation of well-known forms. The Scotch mountains produced a not unprofitable harvest for such enterprising professional collectors as were early in the field, and so soon as Scotch varieties of most of our English Lepidoptera were represented in our best collections, the inducement was strong (and this by no means only a commercial one), to explore further afield and to provide the means of comparing specimens obtained from the northern and western islands of Scotland with those procured at various elevations on the mainland.

In 1880 a collector, sent by Mr. Meek, brought back, after four months' residence in the Shetland Isles, a considerable collection. These were noticed at length by Mr. J. Jenner Weir in the November and December numbers of the 'Entomologist' of that year. The interest excited by this collection induced the same collector, Mr. McArthur, to revisit the islands in 1881, to make an expedition to the Island of Arran in the following season, and to spend three months of 1883 in the island of

Unst, the most northern of the Shetland group. Mr. Jenner Weir has described the results of all these expeditions,* drawing special attention to the extreme variation in colouring exhibited by these northern representatives of more southern forms.

The tendency of this variation has in almost all instances been in the direction of melanism (except in the more southern and western island of Arran), exhibiting a preponderance of darkened scales or a suffusion of the markings, in many cases almost obliterating the paler portions of the wing. Among the species exhibiting this tendency in a greater or less degree may be mentioned *Hepialus velleda*, *H. humuli*, *Noctua festiva*, *N. xanthographa*, *Agrotis cursoria*, *A. porphyrea*, *A. lucernea*, *Dianthœcia conspersa*, *Emmelesia albulata*, *Eupithecia venosata*, *E. nanata*, *Melanippe montanata*, *M. fluctuata*, *Camptogramma bilineata*, &c. This same tendency is observable in the majority of the Lepidoptera and, I believe, of the Coleoptera of the whole Arctic and sub-Arctic regions when contrasted with their more southern representatives.

We have no sufficient evidence at present how far the same rule applies to those of the Antarctic regions; but *Colias imperialis* Butler and *Colias cunninghamii* from the southern extremity of Patagonia strongly favour the belief that it will be found the same in those districts.

It is worthy of remark that where the atmospheric conditions in any degree approach to those of the more northern regions, as they do on high mountain ranges, at varying elevations according to the degree of latitude, the same tendency to assume a darker or more suffused colouring is very frequently observable.

* 'Entomologist,' xiii, pp. 249, 289; xiv, p. 278; xvii, p. 1.

Mr. W. A. Forbes remarks, * 'In looking through Dr. Staudinger's catalogue I was much struck by the fact that in nearly every case where a local form (whether a variety or aberration) from the Alps is noticed, it is characterised as being *obscurior* or *multo-obscurior*, or with some of the markings *obsoleta*.' He goes on to notice the number of normally black or dark species in the Alps, *e.g.*, Erebiæ, Psodos, and some Pyralides.

Various theories have been advanced at different times and by different authors to account for variation in animals, birds, and insects, and it has been attempted to apply some of these to the phenomena which I propose to consider.

I. Since Darwin drew attention to this cause, the theory of protective resemblance has been most commonly made use of to account for the varied colouration of insect forms. It has been proved almost to demonstration in many instances, that by more or less gradually developed assimilation to surrounding objects, those varieties best adapted to escape the observation of natural enemies have become perpetuated.

II. Many instances of varied colouring have been referred to an archaic origin ; that is, to the preservation of such varieties by hereditary transmission from an ancestral source.

III. The influence of quality and quantity of food has been brought forward to account for modifications of normal colouring.

IV. Retarded or accelerated development depending upon climatic conditions acting upon insects in their larval or pupal stages has also been quoted as a cause for variation.

V. Insular varieties have been attributed to the effects of long isolation and segregation tending to establish special races.

* 'Entomologists' Monthly Magazine,' xiv, 16.

VI. Atmospheric electricity has also been called into requisition to account for certain changes.

VII. Mr. Geo. Lewis has argued* that exposure to more or less direct action of the sun's rays may influence colour by acting mechanically upon the tissues of the scales, and so produce an actual modification of their structure, enabling them to absorb and reflect to us certain rays.

VIII. And lastly, the same author suggests, but only to dismiss the idea as '*probably incorrect*,' 'That blackness arises from the invigorating energy derived from warmth, as blackness absorbs heat rays; but [he adds] in that case it would not properly be a protective colour, but an incident in another line of evolution.' †

If we examine these various theories with a view to ascertain how far they can be made to account for that particular tendency to melanism which we propose to consider,

First, it would I think be open to some doubt whether the dark varieties of the northern or Alpine regions are indebted to their colouring for any appreciable measure of protection. In the north of Scotland, and perhaps in the Shetland Islands, the black peaty soil and some few dark lichens growing on the rocks might serve to conceal an insect approaching them in tint.

It has been observed that *Gnophos obscurata* and other insects vary decidedly in colour according to the nature of the soil on which they occur, but if we admit that this cause may have some influence where peaty soil is found, it could not be held to account for the like inclination in the Alpine insects to assume a partial melanism, although it has been called into requisition to explain the melanochroic race of certain Lepidoptera occurring in the manufacturing districts of this country, to which I shall have occasion again to allude.

* Transactions of Entomological Society, London, 1882, p. 503.

† Loc. cit., p. 517.

The only other manner in which such protection might be supposed to arise would be perhaps owing to the strong contrast which would exist between the extreme whiteness of snow and the darker appearance of large or small patches of herbage in its immediate proximity, rendering the latter more nearly black to the perception, at least of human sight, than they would actually be if separated from the shining snow.

It may be admitted that this contrast would render a dark object under such circumstances less visible than a lighter one. But the amount of protection afforded by reason of these special conditions would appear inadequate to account for any strong hereditary tendency to strive to obtain it.

Coming to the question of archaic derivation the researches and experiments of Weismann * and Edwards † may be admitted to have established a well supported theory that in cases of seasonal dimorphism and polymorphism, one or other of the varieties produced is probably that which has descended through the longest period from an ancestral form. Both these authors have called attention to the fact that there is less disposition to vary in the female sex, and if the females are truly more conservative than the males, we should be inclined to look to the former sex as most likely to indicate the typical colouration of an archaic race.

Mr. MacLachlan ‡ pictures the survivors of an arctic fauna moving northward as increasing temperature succeeded the glacial period, a portion of them settling on the tops of high mountains, stragglers reaching the home of their ancestors, and becoming the progenitors of our present arctic species; but he

* 'Studies in the Theory of Descent,' vol. i, and Appendix; English edition.

† 'Butterflies of North America,' and 'Canadian Entomologist,' vol. vii, pp. 228—240; vol. ix, pp. 1—10, 51—55, 203—206.

‡ Journal of Linnean Society, (Zoology) 1878, xiv, p. 105.

fails to suggest that the conditions of existence in those two distinct settlements being approximately the same, a natural law producing certain forms in the one place might be equally operative to produce them in the other.

Admitting the extreme value and interest of these researches, and allowing them their due weight in the collection of evidence upon the general subject, we may remark that their authors in no way profess to account for the primary cause of the melanic tendency, except in so far as they would admit it to be traceable to the external influence of climatic conditions. We may yet ask ourselves what is the exact method by which the pigments are acted upon, and what advantages, if any, do the insects derive from the change.

If it is the inferior quality or scarcity of food which influences the pigments of the scales, we may be driven to accept Mr. G. Lewis' statement that 'The nutritive properties in plants vary as their growth is vigorous or otherwise'; * but, surely, this might land us in a region of fallacy where the largest insects would invariably be found on the tallest trees, and the most minute upon vegetation of the lowest growth.

Starvation does undoubtedly produce abnormal forms, frequently devoid of the usual richness or extent of colouring, but in these the physical strength and development are unnaturally affected, and it might reasonably be expected that the process of ornamentation would be also arrested. Proof is yet wanting that larvæ feeding on lichens or plants of low growth are less vigorous and healthy, or produce less perfect moths than those which may be supposed to be more generously nourished.

Retarded development dependent upon climatic conditions must constantly occur in extreme northern or Alpine regions.

* Transactions of Entomological Society, London, 1882, p. 527.

Mr. MacLachlan, in the paper above referred to,* regards this as a powerful factor in explaining the causes of variation, although he thinks that a 'still more potent one is to be found where the condition of isolation or segregation necessarily exists, resulting in the production of local forms, which in extreme cases are worthy of the term *species*.'

Edwards' experiments with pupæ of *Phyciodes tharos* in a refrigerator † seem to prove that long exposure to cold in this stage does tend to a suffusion or blending in the markings of the perfect insect.

Dorfmeister believes that temperature exerts the greatest influence during the turning into pupa, but nearly as much shortly after the same period; when, however, one or other direction has been taken, it may through the action of the temperature be accelerated or retarded, but cannot be any more changed.‡ And the Rev. J. Green, who has had considerable experience in forcing pupæ, endorses this opinion.§ But even if retarded development is sufficient to account for the production of some of our northern varieties, it fails to suggest any reason for this result or to enlighten us as to the natural law, if any, by which it is produced. Bearing in mind the sombre grey of the perfect insects of the genus Cossus, the brilliant hues of certain of the longicorn Coleoptera, both possessing larvæ which are not developed in a single season, and the growth of many plants whose seeds lie dormant for long periods, the rule is certainly not one of general application.

M. Nícolas Wagner¶ found that electricity applied in the pupal stage turned red to orange and black to red in the

* Journal of Linnean Society (Zoology). xiv, p. 105.

† Canadian Entomologist, ix, p. 205.

‡ Canadian Entomologist, vii, p. 232.

§ Entomologists' Monthly Magazine, iii, p. 255.

¶ 'Bulletin des Séances de la Société Entomologique de France,' vol. xlvii, 1865.

perfect insect; a very feeble current resulting in the production of black spots. Atmospheric electricity may perhaps be a factor in the natural process, especially in arctic or high mountain regions where it is most abundant; but if so, how and why does it act in this manner?

Mr. de Vismes Kane, in his address to the Barnsley Naturalists' Society, * on the Variation of European Lepidoptera, properly pointed out that 'all naturalists are agreed that the strongest developed variations are to be found generally in places where creatures are cut off from intercommunication with the rest of their kind by mountains, vast forests, the sea, or other natural barrier. But, although, as he says, 'isolation begets peculiarity,' I am unable to agree that this is the principal cause of the aberrant colouration of the Shetland insects.

Mr. Lewis, in the paper to which I have referred, † argues in favour of colour in insects being due to a 'photoplastic' process, 'the rays or wave-movements from the sun impressing living organisms with the structure necessary for colour.' He thinks that nocturnal insects are black because not affected by direct rays of the sun. His theory, as I understand it, is that this process is mechanical, effected by the varying rapidity of vibratory motion in the different waves of heat-rays in the solar spectrum, rather than chemical, through those rays acting upon the constituents which go to form pigment.

His theory is for the most part applied to brightly-coloured Lepidoptera and Coleoptera exposed to much sun, and he produces a valuable array of facts in support of it.

This theory appears to me to be open to much criticism, but for the moment we are concerned only to apply it to the special instances of more or less melanic varieties.

* The Naturalist, Nov., 1884, p. 82.

† Transactions of Entomological Society, 1882, p. 504.

If, in Mr. Lewis' words,* 'blackness is a structure formed [mechanically] by heat rays,' why should *Melanippe montanata* be black and white, instead of a uniform colour? Why should these rays act differently upon different portions of the wing of any insect? And should we not expect that northern insects exposed to a less amount of heat than those of the south would assume a less instead of a greater amount of pigment?

Why, again, should the colours of dead insects exposed to light have a tendency to fade? If the scales have lost their supposed plasticity, would they not at least retain their established form?

Must we not search for some law which will better account for the undoubted facts we are dealing with?

Mr. Lewis himself indicates what he rightly describes as another line of evolution, and Mr. Forbes in his paper above referred to,† after quoting Von Tschudi ‡ as to the melanic tendency of Alpine Coleoptera, suggests as the most probable conclusion that 'darkness of colouration is in some *mysterious way* correlated with a constitution better fitted to encounter unfavourable conditions of life more especially meteorological.' Can we endeavour in some degree to solve the mystery which surrounds the question of what is the precise method of evolution, if any, which secures to our dark northern varieties and species a constitution better fitted to enable them to encounter unfavourable meteorological conditions through advantages derived from their peculiar colouration?

Seeing that radiation and absorption alike involve motion, which may be taken to be the basis of the theory of photoplastic mechanical action, we must not forget a point strongly urged by

* Transactions of Entomological Society, 1882, p. 517.

† Entomologists' Monthly Magazine, xiv, p. 16.

‡ 'Monde des Alpes,' p. 394.

Professor Tyndall, namely, the importance to the organic world of the ultra-violet invisible rays of the spectrum *on account of their chemical energy*.* It has been shown by the same author 'that the invisible rays of the sun show a preference for black, which diminishes the reflection.' It is, of course, no new discovery that among colours, black is the greatest absorber of heat. In Craven's 'Recreations in Shooting,'† the following passage occurs, 'Colour is well known to influence the rate by which bodies acquire, reflect, or part with heat, and as white is the colour which most readily and perfectly reflects it, and which most difficultly [*sic*] parts with it, so a body clothed with that colour shall retain heat longest, and therefore be better fitted to exist in the coldest latitudes.' Applying this to the winter plumage of Ptarmigan, he continues quoting from Daniel, (the original passage I have been unable to find) 'If two animals, one of a black colour and the other white, be placed in a higher temperature than that of their own body, the heat will enter the one that is black with the greatest rapidity, and elevate its temperature considerably above that of the other; but when these animals are placed in a situation, the temperature of which is considerably lower than their own, the black animal will give out its heat by radiation to every surrounding object colder than itself, and speedily have its temperature reduced, while the white animal will part with its heat at a much slower rate.' Birds and animals living through the winter naturally require to *retain* in their bodies a sufficient amount of heat to enable them to maintain their existence with unreduced vitality against the severities of the climate. Insects, on the contrary, require *rapidly to take advantage* of transient gleams of sunshine during the short summer season, and may be content to sink into a dormant condition so soon as they have secured the reproduction of their species; only to be revived in some instances by a return of exceptionally favourable conditions.

* 'Fragments of Science,' Tyndall, vol. i., p. 32.

† 'Recreations in Shooting,' Craven, 1846, p. 101.

We all know how rapidly the pairing of our Lepidoptera is effected. Edwards gives instances of freshly developed males gathering round a female pupa to await the emergence of the perfect insect, and the method adopted by many collectors of attracting males by the exposure of a newly emerged female is usually productive of a series of the finest specimens.

I have myself observed in the case of *Acidalia rubricata* on a warm evening in August, the extreme rapidity with which the males appear to be developed, and how immediately they hurry to pay their attentions to the scarcer and less active females which cling to the grasses and occasionally rise to meet them in their flight. I can scarcely imagine a colour better suited for rapid absorption of heat, with the exception of black, than the beautiful dark red of fresh specimens of this insect, unless it be perhaps the brilliant green of the under side of *Thecla rubi.* Applying this to the more or less melanic varieties of high latitudes, I think we have a sufficient explanation of the process of selection by which these varieties are established and continued under the influence of a climate essentially unfavourable to the paler forms. Those males whose colour enabled them to absorb the heat most rapidly would naturally be the first to harden their wings and to acquire a degree of vitality sufficient to enable them to commence their flight. If we imagine the emergence of a pale and a dark variety side by side at the same moment, it is more than probable that the paler specimen would remain inactive among the herbage, when his darker companion had already commenced his flight. In unfavourable weather the degree of warmth sufficient to arouse even the darkest varieties might be of very short duration, and if this were so the less favoured males might be wholly deprived of the degree of energy necessary to enable them to find their females. The shorter the continuance of passing gleams of sunshine, the greater would be the influences brought to bear against them; and each separate instance, however unfrequent such instances

might be, in which they were thus placed at a disadvantage, would have its effect in diminishing their numbers, promoting the survival of only the fittest forms. If this is so it is sufficiently obvious that the first males on the wing have the best chance of transmitting their colour by an hereditary process to the succeeding generation; and if these males were always or usually the darkest of the brood, their progeny would also be for the most part dark.

It may be objected that Professor Tyndall's experiment * with a white substance specially chosen on account of its perviousness to visible rays, and its extreme imperviousness to invisible ones, absorbing heat more rapidly than a dark substance specially chosen on account of its opposite tendencies, proves, as he says, that 'conclusions as to the influence of colour may be altogether delusive,' and that it by no means follows that because a piece of black cloth placed upon snow will sink below the surface, whilst a piece of white cloth in a similar position remains above it, therefore a black insect and a white insect would behave in the same manner under similar conditions. To set this doubt at rest I took advantage of one of the few sunny days during the last fall of snow, with a view to test the comparative rapidity of heat-absorption in some of our common Lepidoptera. On the 23rd of January, at 11.30 a.m., I placed two specimens of *Tanagra chærophyllata*, a black insect from the Yorkshire moorlands, and three of *Acidalia immutata*, a white insect from the Norfolk fens, on a smooth surface of snow exposed to bright sunshine at an angle of about 45°, with them I put a male of *Colias edusa*, a pair of *Satyrus tithonus*, a pair of *Thecla quercus*, and three specimens of *Lithosia stramineola*. A thermometer lying on the grass by the side of the snow stood at 48° Fahr. At noon *Chærophyllata* already showed decided signs of melting the snow, so did *Satyrus* and the female *Thecla*,

* 'Fragments of Science,' vol. i, p. 88.

the black edge of *Colias* which did not lie very flat upon the surface had also made a slight impression, the others had made none. At 12.30 the same three continued to increase their impression, the others still made none.

I then placed a piece of black and a piece of white cloth in the same position. At 1 p.m. the mercury stood at 52°, and the effect produced by the darker insects was still more decided. But although the pale ones remained upon the surface they did not appear to protect the underlying snow from the heat rays to the same degree as did the white cloth, which remained on a slight eminence as the sun thawed the snow around it. The nearest approach to this protection was evidently accorded by the white *Acidalia immutata.* At 1.30, *Chærophyllata* and the black cloth continued to sink, and the male of *Thecla quercus* was apparently giving off as much heat below it as the female, but not being set with the wings equally flat had not shown the effect so soon. The Lithosiæ had by this time also had a very slight effect upon the snow, but not so much as any of the darker insects, and *Chærophyllata* had decidedly won the downward race among them.

I then removed them; and though the limited time during which the experiment lasted was amply sufficient to solve the proposition, I much regret that I did not leave them during the night, for on the following morning the contrast between the positions of the black and white cloths was far more strongly marked, and quite in accordance with the result obtained by Benjamin Franklin in his similar but original experiment.

I regret this the more, bearing in mind the rule: that, as the intensity of heat diminishes absorption increases; for I should have wished to determine whether the insects would have maintained their relative positions when no longer exposed to the sun. This is a point to which further investigation should be directed. It must necessarily occur to you that

although the actual amount of sunshine in the arctic and sub-arctic regions is infinitely less than in latitudes more nearly approaching the equator, the length of daylight is considerably greater during the summer months. In the absence of actual frost a varying amount of absorption would still be in progress, even when the sun had ceased to shine, and this could not fail to have its effect in cases where the vital energy of the insect was not dependent upon direct solar rays. Captain Feilden records that during the short period when there is practically no night, butterflies are continuously on the wing, supposing the sun's face to be not obscured by clouds or passing snow showers.*

The chemistry of colour in living organisms is a subject which has been but little studied.

The researches of Dr. Sorby, one of my distinguished predecessors in your presidential chair, will be still fresh in your memory. I am indebted to his kindness for enabling me to refer to several of his valuable papers published in various scientific journals. He discovered the presence of several interesting substances in the colouring matter of shells, egg shells,† and human hair.‡ His experiments would certainly favour the conclusion that although radiation and absorption alike involve motion, changes of colour due to external circumstances acting upon living organisms are dependent upon chemical rather than upon strictly mechanical action.

This is supported by Newport's discovery§ that insects possess the greatest amount of natural heat at the moment when their wings are just dried and hardened. Finding that respiration increased and diminished in the same degree as temperature

* Mac Lachlan, Journal of Linnean Society, xiv, p. 103.

† Proceedings of Zoological Society, 1875, p. 351.

‡ Journal of Anthropological Institute, 1878, p. 1.

§ Philosophical Transactions R. S., vol. 127, p. 259, *et seq.*

he attributed the increase of heat to the more rapid respiration of the insect, through an accession of vital energy. His conclusion was that chemical changes in the air during respiration are immediate sources of animal heat. It is also worthy of notice that he found carbonic acid distinctly present in the gaseous expenditure of the bodies of insects in different stages when exposed to heat.

Mr. M'Munn proves the existence in animals of true chlorophyll not derived from vegetable substances.*

This in the case of plants has been held to be produced by the vibratory influence of light, and the consequent oxidization of protoplasm.

Mr. Charles Morris writes 'Every vibration, even of the slightest, from whatever source, which enters into and acts upon protoplasm apparently induces combination with oxygen (if this element be present) with a consequent freeing of motor-energy and production of change.' †

And, again, 'Oxidation yields a quantity of free energy. The sunlight which instigates oxidation also yields, perhaps as vibration of the cell-contents, a quantity of free energy. The energy thus set free does not manifest itself as mass-motion or as temperature. It is undoubtedly consumed in the formation of the starch molecules, and is one of the most important requisites to carbon assimilation.' ‡

If this is so in plants is it unreasonable to suppose that a certain proportion of freed energy, not required as motion or temperature, may in insects also be consumed in the formation of molecular substances, affecting in a greater or less degree the colour of their wings?

* Journal of Royal Microscopical Society, 1883.

† 'American Naturalist,' xvii, p. 141.

‡ Tom. cit., p. 264.

This would also in another way tend to assist that process of evolution in the direction of melanism which I have attempted to indicate. Those insects which most rapidly and most completely acquire vital energy through the absorption of heat would be the most likely to possess under favourable conditions a superabundance of such energy.

If their organic chemistry, as in the case of plants, permits this surplus to be devoted to the deposition of molecular substance, would it not be applied by this natural process to the formation of pigment?

On this assumption M. Nicolas Wagner's electrical experiments are not unintelligible. What is more certain to produce 'free energy by vibration of the cell contents' than electricity? And where a large surplus was thus artificially created, we not unnaturally find increased deposition of colouring matter in the hollow cell-like scales.

If this is possible, it may be taken to be an important factor in the development of varietal colouration, acting and reacting for the advantage of the species. As in the colder latitudes black appears to be the colour most beneficial to their interests, so in tropical regions other colours may play their part in various ways, either in defending them by reflection from too intense heat-rays,* or in protecting them from enemies by assimilation to surrounding objects. Without implying any distinct act of volition on the part of the subject, we may fairly admit the objective power of Nature in a thousand unknown ways to produce results enabling all existing species, in the absence of prohibitive conditions, to maintain a balance proportionate to their importance in the general system.

Shall I be too bold if I would endeavour to account for the acquisition of summer plumage in birds, and darker colouring in arctic animals during the summer months, by supposing

* The insects of hot deserts are very frequently white or pale yellow.

that a considerable increase and superabundance of motor energy through the accession of warmth, causes a surplus of oxygenated protoplasm to be applied to the deposition of pigmentary molecules in the tissues of their fur and feathers?

Mr. Harting informs me that ptarmigan assume summer plumage even on mountains where snow remains during the summer months.

A black hare, one of two killed at Merton, in Norfolk, some years ago, was mounted in a glass case for my collection. Moths got into the case, and the skin was taken out and soaked in benzine; when the benzine had evaporated the fur was found to be losing its rich colour, and to have a tendency towards the natural brown. If the black was owing to an excess of any greasy pigmentary deposit, the benzine by detaching it would facilitate its bleaching.

Dr. Sorby * found reason to believe that the development of black colouring matter in hair as in human skin increased by the action of light, and that the amount of colouring matters in living organisms exposed to light were increased even when the same matters were rapidly decomposed by light when extracted from the living tissue. He found that 'some of his pale-coloured solutions of hair in diluted sulphuric acid do really turn very much darker when kept in direct sunlight, though most solutions of organic colouring matters fade more or less rapidly.'

We might naturally suppose that this observation would rightly account for the blackness of the human skin in the African and Indian races. But Lieutenant-Colonel A. F. Fraser † writes that 'the experience of Europeans in India is that the sun does not burn; if anything it rather whitens them and pales the complexion. It is only on certain conditions when the sun is obscured by rain clouds, it is cool and the

* Journal of Anthropological Institute, August, 1878, p. 11.

† 'Nature,' Nov. 6, 1884.

diffused light is of a particular but unascertained actinic quality, that the skin of a European is sunburnt.' Mr. Winwood Reade * remarks that the negroes are blackest where the climate is dampest, those away from the swamps inclining more to brown. Mr. Edward D. Blyden, Professor in Liberia College, Monrovia, † states that mulattoes in that country are very frail and incapable of continued exposure or exertion. If, as Tyndall points out, the ultra-violet rays have the strongest chemical effect upon living organisms, these experiences would tend to prove that what is known as sunburning is owing to chemical action; for the ultra-violet rays would be less intercepted by rain-clouds or mist than would the light-giving rays of the solar spectrum. In any case it would at first sight appear that the dark-skinned man is less adapted for the conditions of existence in a tropical climate than is the white-skinned man. But this is opposed to all experience. It is well known that a native can go on working in tropical sunshine where a white man would be by heat quite incapacitated for exertion. The simple explanation which suggests itself is: that since the rate at which bodies radiate or part with heat is equivalent to that at which they absorb it, the capability for rapid relief is proportionate to the increased susceptibility; and if the advantages gained by the power of rapid radiation outweigh the disadvantages of rapid absorption in the first instance, the darker a man's skin the less is he afflicted by the retention of heat, which would prevent a white man from working for any length of time under a tropical sun, and the more suited is he to undertake the required exertion. There may or may not be some uniformity in the process by which it is acquired—there is certainly a complete difference in the nature of the benefit derived—but it is at least extremely probable that tropical men and arctic insects do derive certain appreciable advantages from the darkness of their colouring, under absolutely opposite conditions.

* 'Savage Africa,' p. 18.

† 'Smithsonian Report,' 1870, p. 387.

In the case of Arctic insects it would be not only important that they should become adapted to avail themselves of any advantages they could derive from unfrequent and transient gleams of sunlight, uninterrupted by cloud or mist, but that any similar advantage in a less degree through the prolonged hours of ordinary daylight should not be lost to them.

In photography it is well known that intense light produces a far more rapid chemical effect than that which is more or less subdued, nevertheless a long exposure to the latter may give in the end approximately as good results.

The case of *Gnophos obscurata*, and many other similar instances of insects assuming the colour of the soil or of the objects which surround them, might almost tempt us to believe that a kind of natural photographic process capable of imparting colour by reflection was not impossible, for although this protective resemblance is not usually acquired so rapidly as in the case of Mr. James Angus' white spider, * which became yellow on being transferred from a white to a yellow flower; yet it may be questioned whether the gradual change extends through a sufficient number of generations to justify the assumption that it is produced by a system of natural selection. The suggestion may indicate a line of enquiry to some one better qualified than myself to follow or to discard it.

If I have rightly accounted for the melanic tendency in our northern Lepidoptera by supposing it to be due to the advantages derived by the darkest insects under special climatic conditions, from their more rapid absorption of invigorating warmth; and perhaps to the application of surplus vital energy, through increased vibration of cell contents, to the deposition of pigment; we should be led to expect certain evidences in its favour, in addition to those I have already mentioned. The

* 'American Naturalist,' vol. xvi, p. 1010.

males of northern species being more in need of heat-absorbent colouring than the females for the reason indicated in the case of *Acidalia rubricata*, might be expected more completely or more quickly to assume it, and that conservatism which Edwards and Weismann have attributed to the female sex, would be at least partially accounted for.

I believe it to be a fact that the females of the Shetland Lepidoptera are in some degree less differentiated from the typical forms than the opposite sex, although the distinction is not strongly marked. Mons. Girard found by experiment an excess of natural warmth in males over that of females.*

It might also be expected that whereas the arguments which I have used can obviously apply to the perfect insects only, the larvæ would show no tendency to vary in the direction of melanism, I am informed by Mr. Meek, to whose spirit of enterprise we are chiefly indebted for these interesting additions to our cabinets, that he has not noticed that the larvæ of Lepidoptera differ in color from north to south; he has had many opportunities of observing this point, having collected for many years in all parts of the country, and his opinion is that they do not.

Black varieties of larvæ are not unknown; a black form of *Abraxas grossulariata* occurs in the neighbourhood of Newcastle, but the perfect insects produced from these larvæ are of the ordinary type and by no means melanic. The day feeding larvæ of the genus Melitæa are almost uniformly black, but not more so in the north than in the south, and these feeding for the most part upon different species of Plantago, have the advantage of strong protective resemblance to the black undeveloped flower-heads. Yet no genus of butterflies exhibits more

* 'Etudes sur la chaleur libre des invertébrés'—Annales des Sciences Naturelles, 5th ser., vol. xi, p. 201.

clearly the tendency to suffusion of colouring in the perfect insects, and the resemblance between arctic and alpine variation.

We should expect to find varieties tending to assume absorbent colouring not only in the Arctic and Alpine regions, where the amount of cloud and mist must greatly diminish the incidence of direct sunlight, but also under any conditions which would limit it in an artificial manner. Dr. J. Hann * strongly insists upon the chemical energy and potentiality of diffused sunlight; corroborating and supplementing Tyndall's observations to this effect. The smoke of our furnaces in the manufacturing districts, and of our chimneys in large towns, undoubtedly deprive the urban population of their fair share of undiffused sunlight within the radius affected by them. Accordingly we find several instances of more or less melanic forms occurring in such situations. I have in my own collection an almost black variety of *Hemerophila abruptaria* taken by Mr. Sidney Olliff in London, and *Boletobia fuliginaria* in this country is essentially a London insect. In the neighbourhood of Manchester, as I am informed, the dark variety of *Amphydasis betularia* has become not uncommon of late years.

Other instances, such as the black variety of *Abraxas grossulariata* from Lancashire, *Polia chi*, the suffused form, *olivacea*, from Newcastle, and *Tephrosia crepuscularia* and *biundularia* from Barnsley, are probably familiar to you.

We should expect insects occurring in dense forests to be darker than those of the open country, and so far as my Californian experience goes this is undoubtedly the case. Mons. Bellier de Chavagnerie remarks that chrysalids in dark caves produce darker specimens. All fishes from the very deep sea inaccessible to the sun's rays are either colourless or entirely black.

* 'Handbuch der Klimatologie,' 1883, p. 73.

It would have been interesting to compare the actual amount of uninterrupted sunlight in the districts to which I have referred, with that of others less affected by mist or smoke ; but I regret to find that there are no sufficient records available to enable me to lay this comparison before you. If, as there is reason to suspect, the incidence of direct sunshine has become sensibly diminished in certain districts, we may perhaps be justified in predicting that yet more darkened or suffused varieties of our common insects may be found within those districts in years to come.

Since butterflies are in the habit of resting with their wings erect, whereas the wings of moths are placed in a different position ; we might expect to find the change, if any, more noticeable on the under surface of the former, rendering them, (as is the case especially in the frequently hybernating genus Vanessa, and in the greenish Arctic forms of Colias), well fitted to absorb heat in repose ; and on the upper surface of the latter, for the same purpose as has already been observed.

Summing up the conclusions to which I have endeavoured, however imperfectly, to guide your attention, it may be granted that a tendency to variation in the direction of melanism is noticeable not only in Lepidoptera of high latitudes, but also in others exposed to approximately the same climatic conditions.

It is known that black, green, and red are the most rapid heat absorbers in ordinary substances, and it is proved that in the case of black this applies also to insects.

The advantage which insects would derive from an increased power of rapidly acquiring warmth in cold or sunless situations can scarcely be disputed.

The chemical importance of diffused sunlight, probably through the action of the ultra-violet or invisible rays, which show a preference for black, must not be overlooked.

The manner of increasing that advantage in proportion to the excess of energy resulting from its possession has been indicated, and if not actually proved, has I think been fairly argued from analogy, by comparison with the chemical action known to occur in plants.

It has been shown how the same kind of action might not unreasonably account for similar results in birds, animals, and human beings, contributing in each instance to the advantage of the subject; and if the sketch has been somewhat imperfect, I rejoice to feel that there is no scarcity of naturalists more able than myself who will gladly apply themselves to the task, either of effacing it entirely, or of filling in the required details.

The proved existence of what are merely extreme local varieties of known and described species should warn us that while on the one hand we should avoid a too hasty conclusion that specimens exhibiting some affinities of colour and structure yet found to differ in a more or less important degree, are not specifically distinct from others with which we are acquainted, we should even more carefully guard ourselves against giving separate names to such divergent forms as if they were true species, simply because they come to us from some remote locality, or because we possess no series of connecting links between these and their nearest allies.

I am by no means disposed entirely to condemn the system of trinomial nomenclature now widely adopted in America, especially in ornithology; provided always that this system is confined to climatic or geographical races, varying according to known conditions, such as latitude, elevation, temperature, moisture, etc. It might perhaps, as in the case of many of the Shetland insects, simplify rather than confuse the process of exact recognition. The abuse rather than the use of the system is to be feared. Should everyone who discovers a slight varietal difference think himself entitled to apply to it a third name, the

study of natural history would soon become encumbered with trivial terms, such as those in use among the cultivators of selected and hybridised varieties of plants.

I think there has been of late years too great a tendency among entomologists to attach specific value to minute differences of colour and markings unaccompanied by structural divergence; and although this excess of zeal may have some value in drawing attention to the fertility of resource exhibited by Nature in the process of differentiation, it has its extreme disadvantages in producing long lists of synonyms, rendering the work of scientific investigators in the future more difficult and laborious. If we are to depend upon the possibility of acquiring complete life histories of the many rare and unique forms which adorn the collections of specialists, before we may venture finally to determine whether many of these are, or are not, entitled to specific rank, there is indeed a task before those who would study the insect fauna of the world, which must necessarily occupy a vast number of generations. The mass of ever-increasing literature on all subjects at the present day is constantly rendering more difficult the task of mastering the details of any appreciable part of it. It is only too probable, as has been the case in the history of the world from the earliest dawn of civilisation, that one generation may forget what another knew, and that men may devote their time and energy to lines of research which have long since been followed to their legitimate deductions.

The value and importance of societies such as are represented here to day, can scarcely be over-estimated. They afford to those who are most in need of such enjoyment the opportunity of acquiring an insight into the pleasures and interests of country life, and the often much-needed fresh air and recreation of which their town pursuits would deprive them. Moreover, they add greatly to the sum of our knowledge, by establishing the interest of individual members in different lines of enquiry

into natural phenomena which present innumerable problems for solution to the human mind. Like the speculative industry of the miner for gold or diamonds, the study of natural history presents its special prizes in those bright gems of information and discovery which in exceptional instances delight the hearts of its true votaries.

Time will not permit me upon this occasion to indicate the numerous branches of this subject, or to suggest those problems which occur to my mind as still awaiting investigation. Almost every scientific periodical teems with matter suggestive of such problems.

How little is known, for instance of the pattern and form of the eggs of Lepidoptera. Mons. Goossens' paper * is, so far as I know, the only instance in which notes on this subject have ever been made, tending to assist us to correct the classification. It would be interesting to test the opinions of some of our lepidopterists by this means. Mr. Butler's paper upon the genus Acronycta,† in which he assigns our British species to a number of distinct families, is well known to you. It would be useful to determine whether the microscopical examination of the eggs would tend to confirm or to refute his views. Again, how few of the larvæ of the Coleoptera are known to entomologists, and how interesting in many cases are their forms and habits, varying from the shelter-making Cassidæ of Brazil, to the parasite Stylops and Meloë in our own country. The habits of some of our common birds can be shown to be undergoing a gradual change. The grouse of our Yorkshire moors, which fifty years ago would allow the approach of a sportsman and his dogs even so late as the end of October, are now packed together on the highest ground at the commencement of the shooting season. The evidence I have collected on this subject

* 'Annales de la Société Entomologique Française,' Oct. 1884.

† Transactions of Entomological Society, 1879, p. 313.

tends to show that this change had already come into operation some time before the commencement of the system of driving, with which it has often been erroneously associated. Whether this depends upon any alteration of climatic conditions, such as has undoubtedly affected the growth of cereals, at certain elevations, I am not prepared to say. It is for you naturalists of Yorkshire to determine by enquiry and comparison whether we should be justified in attributing it to this cause.

The origin and history of the grouse disease, doubtfully attributed by Dr. Cobbold to the entozoic parasite named by him *Strongylus pergracilis*, is but little known or studied.

Already you have done much useful work. Mr. Nelson and Mr. Taylor are still engaged upon their detailed and annotated list of Land and Fresh-water Mollusca of Yorkshire: this contains many interesting notes, and is especially valuable for the care with which the distribution of the various species has been studied. The Marine shells have received the attention of Mr. Hey, and we are indebted to him for a useful list published in the Naturalist.

The Botanists have as usual, been very industrious, headed by your late President, whose address on the 'Fathers of Yorkshire Botany,' has been published during the past year. They have also been ably represented by the Rev. H. H. Slater, with his completed Flora of Ripon, by Mr. F. Arnold Lees, and by Mr. Hobkirk, who has published a second edition of his well-known Synopsis of British Mosses.

In Ornithology, Mr. Eagle Clarke and Mr. Cordeaux have been doing good work as Members of the Migration Committee of the British Association.

In Ichthyology, Mr. George Brook, who has devoted his attention more especially to the embryology of fish, may be

mentioned as having published papers thereon in the Journal of the Linnean Society.

Palæontologists have not been idle. Mr. Hudleston's papers in the Geological Magazine, on the oolitic fossils, are a valuable contribution by one of your members to a knowledge of the geology of Yorkshire; and Mr. J. W. Davis has recently published an elaborate monograph of the British Fossil Fishes.

Entomologists are never idle. Mr. Porritt's list of the Lepidoptera of Yorkshire is one of the most valuable county lists that has yet been published. If, as in part a Norfolk man, I claim also a high approval of Mr. Barrett's Norfolk catalogue, I shall be paying no less generous tribute to the patient observation and industrious verification which has been brought to bear upon the Yorkshire list by its author, who is much entitled to our thanks and congratulations.

I believe I am right in saying that at this moment Yorkshire can boast of possessing more local Natural History Societies than any other county in England; even exceeding in their number, those of the whole of Scotland. In comparing the results, so far as the addition of new species to our British lists can enable us to estimate the work done, you may congratulate yourselves upon a goodly average since the year 1855.

In Lepidoptera, with twenty-six additions, you are only three species behind the number attained by Kent, which has been the most successful county. Surrey, Hampshire, Norfolk, Scotland, and Lancashire following at no great distance, with 23, 20, 19, 18, and 13 respectively.

In Coleoptera, the London district heads the list with no less than 60 additions, Scotland claims 56, Surrey 42, Kent 39, and Yorkshire 26.

I am not prepared to vouch for the absolute correctness of these figures, which have been somewhat hastily extracted, but

they are sufficiently approximate to show a good share of scientific work to your credit, and to form an incentive to the Coleopterists of Yorkshire to endeavour to rival the success of their brethren of the net.

In concluding, I must also congratulate you upon the work of your two honorary secretaries, Mr. Roebuck and Mr. Clarke. Their willing energy has contributed much to the success of the Union, of which there is no better proof than the series of valuable publications which they edit.

The acquisition of 'The Naturalist' has been a great and important step in the development of our society, and a means of spreading additional knowledge among and beyond your members.

If I have felt myself at some disadvantage in occupying your presidential chair after three distinguished Fellows of the Royal Society, I am the more honoured by having been elected in such succession, and I shall long remember with pride the compliment you have paid me. My only regret is that my numerous duties and engagements have prevented me from attending more of your meetings. They will not permit me to be in England at this time next year. Had it been otherwise I should have had renewed pleasure in again placing myself at your service in accordance with the flattering request which has been conveyed to me.

For this and for your kind attention I have only now to thank you with much cordiality.

865. **Polemonium cæruleum.** Jacob's ladder. Leckby Carr (Plues) ; white form near Fountains (Mrs. Berkeley).

866. **Convolvulus arvensis.** Lesser convolvulus. A troublesome weed.

867. **C. sepium.** Greater convolvulus. A more troublesome weed.

871. **Cuscuta Epithymum.** Common dodder. Made its appearance in a field near Ripon North Bridge some years ago, where it was noticed by Mr. Lees (l. c.), Miss Morton (who gave me specimens), and others. Has now disappeared again.

873. **Solanum Dulcamara.** Woody night-shade. Stream sides and damp places, common.

875. **Atropa Belladonna.** Deadly night-shade. Fountains (F. A. Lees, l. c.) but intermittently ; Knaresborough, 1881, in damp places under the rocks. Mrs. Berkeley saw it there the same year as the writer.

876. **Hyoscyamus niger.** Hen-bane. Recorded by Lees (l. c.) from Laver district ; used to grow at Bishopton Close, but is now certainly extinct there, as I watched the spot for three consecutive years.

Datura Stramonium. Thorn-apple. This alien suddenly appeared in 1881 in some abundance in a potato ground at the back of one of the houses in Ripon Market Place stretching towards Skellgate.

877. **Verbascum Thapsus.** Great mullein. Waste ground, occasional. Ure Banks near Masham ; roadside, Hutton Moor ; Fountains ; Wickliffe (Plues).

880. **V. nigrum.** Black mullein. Near Robin Hood's Hill, Studley (Miss Morton).

884. **Scrophularia balbisii.** Water figwort. By the Ure, but not abundant. In small quantity in a small stream near How Hill.

886. **S. nodosa.** Common figwort. Woods and waste places, common.

888. **S. vernalis.** Yellow figwort. Near the house of Mr. James Carter, Masham. I have not been able to satisfy myself that it is truly wild there.

889. **Digitalis purpurea.** Foxglove. Banks, woods, &c., common, especially on the sandstone.

890. **Antirrhinum majus.** Greater snap-dragon. Old walls. Fountains Abbey (Plues et al.).

892. **Linaria Cymbalaria.** Ivy-leaved toad-flax. Old walls, common.

897. **L. vulgaris.** Common toad-flax. Banks and hedges, common.

898. **L. minor.** Lesser toad-flax. Railway banks between Hutton and Melmerby station, on any bare bits of ground, even amongst the sleepers; an insignificant plant. Was also found growing on the line near Richmond at the Y. N. U. meeting there in 1881.

899. **Mimulus luteus.** Monkey-flower. Sides of streams. Still to be found by the Skell near Fountains, whence it has been so often recorded.

902. **Veronica hederifolia.** Ivy-leaved speedwell. Hedges and waste ground, abundant.

903. **V. polita.** Grey field speedwell. Cultivated ground. One of the less common speedwells.

904. **V. agrestis.** Field speedwell. Cultivated ground, common.

905. **V. buxbaumii.** Buxbaum's speedwell. Waste places, rare and occasional.

908. **V. arvensis.** Wall speedwell. Walls and dry places, common.

909. **V. serpyllifolia.** Thyme-leaved speedwell. Waysides, &c., abundant.

915. **V. officinalis.** Common speedwell. Dry woods and banks, abundant.

916. **V. Chamædrys.** Germander speedwell. Waysides and waste places, abundant.

917. **V. montana.** Mountain speedwell. Hilly woods, rare. Hackfall, in small quantity.

918. **V. scutellata.** Marsh speedwell. Wet places, not common. Near Fountain's Hall (Mrs. Berkeley); Sharow mires; Pilmoor Carr, Sharow.

919. **V. Anagallis.** Water speedwell. Ditches, less common than last. In some plenty in a small sluggish brook which enters the Ure near Hutton Conyers; on the old Race-course.

920. **V. Beccabunga.** Brooklime. Ditches, wet places, and margins of pools, very common.

921. **Euphrasia officinalis.** Eye-bright. Pastures, &c., abundant.

922. **Bartsia Odontites.** Red bartsia. Fields and pastures, common.

925. **Pedicularis palustris.** Greater red rattle. Marshy pastures, not abundant. Marfield, Masham; Hutton Moor.

926. **P. sylvatica.** Lesser red rattle. Pastures and heaths, common. Was in flower on November 14th, 1881, near Healey.

927. **Rhinanthus Crista-galli.** Yellow rattle. Meadows, abundant. Var. *b.* (major), not uncommon. Pilmoor Carr, near Sharow; boggy fields near Galphay, &c.

930. **Melampyrum pratense.** Cow-wheat. Woods, not very common. Hackfall, &c.

932. **Lathræa squamaria.** Tooth-wort. Shady woods where hazels grow, not uncommon, but much rarer some years than others. Studley and Mackershaw.

941. **Orobanche minor.** Lesser broomrape. Ure Bank district (Lees, l. c.); near Bishopton.

942. **Verbena officinalis.** Vervain. Waysides and old walls. Ure Bank district (Lees, l. c.); not uncommon on the banks of the Ure.

943. **Lycopus Europæus.** Gipsy-wort. Only noticed at Sharow mires, where it is plentiful.

944. **Mentha rotundifolia.** Round-leaved mint. Wet places, not common. Near Fountains.

946. **M. sylvestris.** Horse-mint. Wet places. Hackfall district (Lees, l. c.).

947. **M. viridis.** Spear mint. On the banks of the Ure below Ripon, abundant; an escape.

951. **M. hirsuta.** Hairy mint. Wet places, not uncommon.

952. **M. sativa.** Wet places, rare. Newby district (Lees, l. c.).

957. **M. arvensis.** Corn mint. Cornfields and waste places, common.

959. **Thymus serpyllum.** Wild Thyme. Dry pastures and banks, common.

961. **Origanum vulgare.** Marjoram. Hedges and waysides. Unusually abundant near Ripon.

962. **Calamintha Clinopodium.** Wild basil. Roadsides, not abundant. Copt Hewick, &c.

963. **C. acinos.** Basil thyme. Not uncommon on arable land.

964. **C. nepeta.** Lesser calamint. Dry waste places. Newby district (Lees, l. c.).

965. **C. menthifolia.** Calamint. Dry waste places, rare. Newby district (Lees, l. c.); Hutton Conyers.

968. **Nepeta Cataria.** Cat-mint. Dry waste places, rare. Banks of Ure district (Lees, l. c.).

969. **N. Glechoma.** Ground ivy. Banks and woods, abundant.

970. **Salvia verbenaca.** Wild clary. Dry waste places, rare. Nunwick (Miss Morton); Fountains district (Lees, l. c.); Castle Hill, Richmond.

972. **Prunella vulgaris.** Self-heal. Woods and fields, abundant.

973. **Scutellaria galericulata.** Skull-cap. Wet places. Only noticed at Sharow mires.

976. **Marrubium vulgare.** White horehound. Dry waste ground, not uncommon. Mackershaw ; Knaresborough (Mrs. Berkeley) ; Boroughbridge (Baines).

977. **Ballota nigra.** Black horehound. Hedges, not uncommon. Leckby Carr ; Fountains village.

978. **Stachys Betonica.** Wood betony. Woods, very abundant.

979. **S. germanica.** Downy wound-wort. Not uncommon near Ripon—in gardens.

980. **S. palustris.** Marsh wound-wort. Wet places, common.

981. **S. ambigua.** Hybrid wound-wort. Occasional on cultivated ground near Sharow ; does not mature its fruit (see Hooker, Student's Flora, ed. ii., p. 304).

982. **S. sylvatica.** Hedge wound-wort. Woods and hedges, common.

983. **S. arvensis.** Corn wound-wort. Cornfields, common.

984. **Galeopsis Ladanum.** Red hemp nettle. Dry fields, not uncommon.

986. **G. versicolor.** Bee nettle. Cultivated ground, not uncommon. Near water-works, Ripon ; Givendale ; Leckby Carr.

987. **G. Tetrahit.** Common hemp nettle. Fields, especially corn-fields, common.

988. **Leonurus cardiaca.** Mother wort. Waste places, near habitations, not indigenous. Hackfall and Grewelthorpe (Baines).

989. **Lamium amplexicaule.** Henbit dead-nettle. Cornfields, not uncommon.

992. **L. purpureum.** Red dead-nettle. Waste ground, very abundant.

994. **L. album.** White dead-nettle. Abundant.

995. **L. Galeobdolon.** Yellow dead-nettle. Not a common plant in general, but very abundant near Ripon in woods.

996. **Ajuga reptans.** Bugle. Woods, common.

1002. **Teucrium Scorodonia.** Wood sage. Woods, common.

1003. **Echium vulgare.** Viper's bugloss. Sandy waste ground, not uncommon. Below Hewick Bridge; Thieves' Gill.

1009. **Lithospermum officinale.** Gromwell. Copses and hedge banks, uncommon. Knaresborough Abbey (Baines); Hackfall district (Lees, l. c.); Marfield, Masham, in thickets.

1010. **L. arvense.** Corn gromwell. Cornfields. I think I ought to have found this plant near Ripon, as it is a common one, but I never happened to do so.

1011. **Myosotis cæspitosa.** Tufted scorpion-grass. Watery places, not common.

1012. **M. palustris.** Water scorpion-grass. Wet places, common.

1015. **M. sylvatica.** Wood scorpion-grass. Woods, not common. Hackfall; Mackershaw; Spa Gill (Mrs. Berkeley).

1016. **M. arvensis.** Field scorpion-grass. Waysides and fields, abundant.

1017. **M. collina.** Early scorpion-grass. Dry places, common.

1018. **M. versicolor.** Blue and yellow scorpion-grass. Sandy places and old walls, common.

1019. **Anchusa arvensis.** Common bugloss. Corn and clover fields, local.

1024. **Symphytum tuberosum.** Tuberous comfrey. Hackfall district (Lees, l. c.); grows in wet places.

S. asperrimum. Prickly comfrey. An escape from cultivation; found by the river side in Hackfall; by some of the roadsides near Sharow; &c.

1025. **Cynoglossum officinale.** Hounds-tongue. Waysides and waste places. Boroughbridge district (Lees, l. c.). Miss Plues considers it "common near Bishopton"! I can only say that I used to be at Bishopton twice every day for two years and a half and saw no traces of it.

1028. **Pinguicula vulgaris.** Butterwort. Marshes, uncommon. Marfield, Masham.

1029. **P. grandiflora.** Large-flowered butterwort. Has been introduced near Ripon, from Cornwall. If found by any botanist during the next few years, it is hoped it will not be taken, but left to multiply.

1032. **Utricularia vulgaris.** Bladder wort. Ponds and ditches, rare. Pond near Bull Close (Miss Morton); ditches near Littlethorpe.

1034. **U. minor.** Lesser bladder wort. Ponds and ditches, rare. Wet ditches on Hutton Moor (Archdeacon Pierson); Leckby Carr (Baines). Formerly at Staveley Carrs (Baines), now drained.

1036. **Hottonia palustris.** Water violet. Ponds and ditches, local. Several ponds near Ripon.

1037. **Primula vulgaris.** Primrose. Woods and fields, plentiful, and would be more so, if selfish barbarians would refrain from removing the roots by wholesale. Hybrid varieties between this and the next species, which are erroneously called "Oxlips," not uncommon (See Baines in loc.). The true Oxlip is confined to Suffolk, Cambridge, and Essex.

1038. **P. officinalis.** Cowslip. Fields and copses, plentiful.

1040. **P. farinosa.** Bird's eye primrose. Wet pastures and bogs, common, considering that Ripon is about its southernmost limit. Near Masham, in plenty;

Clotherholme ; Grantley ; Leckby Carr ; Hutton Moor (scarce) ; &c.

1043. **Trientalis Europæa.** Chickweed wintergreen. Heaths and woods. Laver district (Lees, l. c.) not uncommon ; said to grow near Brimham Rocks, not an unlikely habitat.

1044. **Lysimachia thyrsiflora.** Tufted loose-strife. Bogs and wet ditches, rare. Leckby Carr ; Gormire under Hambledon, west of Thirsk.

1045. **L. vulgaris.** Loose-strife. River banks and wet places. Ure banks near Newby. Lees (l. c.) records it from the Boroughbridge district ; these two localities may be identical ; Sharow mires.

1047. **L. Nummularia.** Money-wort. Wet woods and meadows, uncommon. I only recollect finding it at Sharow mires.

1048. **L. nemorum.** Wood loose-strife. Damp woods, pretty common. Very abundant at Hackfall.

1049. **Anagallis arvensis.** Pimpernel. Waste ground, common.

1051. **A. tenella.** Bog pimpernel. Bogs and wet pastures, not common. In a marshy field on Hutton Moor ; Clotherholme (?).

1054. **Samolus Valerandi.** Brook-weed. Ditches and wet places, rare. Hutton Moor ; Boroughbridge district (Lees, l. c.).

1061. **Plantago major.** Greater plantain. Fields and waste ground, common.

1062. **P. media.** Hoary plantain. Fields and waste ground, common.

1063. **P. lanceolata.** Ribwort plantain. Fields and waste ground, common.

1066. **Littorella lacustris.** Shore-weed. Gravelly margins of lakes and ponds. Pond near Marfield, Masham. "Wet places on Hutton Moor" (Brunton). There is

a pond on Hutton Moor, part of which has a tolerably gravelly bottom, but all the years I have been there, there has been too much water to suit this plant. It will not improbably be found there in a dry summer.

MONOCHLAMYDEÆ.

1075. **Chenopodium album.** White goose-foot. Waste ground, common.

1080. **C. rubrum.** Red goose-foot. Waste ground, not common. Near Sharow ; Laver district (Lees, l. c.).

1083. **C. Bonus-Henricus.** Good King Henry. Waste ground, common.

1085. **Atriplex angustifolia.** Narrow-leaved orache. Waste ground, not uncommon.

1086. **A. erecta** (*A. patula* of Linn. See Baines, & Hooker's Students' Flora). Waste ground, about as common as the foregoing.

1094. **Rumex conglomeratus.** Leafy-panicled dock. Damp places, common.

1095. **R. nemorosus** (var. *a*), green-veined dock. Waysides and waste places, not uncommon.

1099. **R. obtusifolius.** Broad-leaved dock. Fields, roadsides, and waste places, common.

1100. **R. pratensis.** Sharp-leaved dock. Damp shady places, not uncommon. Sharow mires, &c. Perhaps a hybrid.

1102. **R. crispus.** Curled dock. Fields and waste ground, common.

1103. **R. aquaticus.** Grain-less water dock. Wet places. Boroughbridge district (Lees, l. c.).

1104. **R. Hydrolapathum.** Great water dock. Ponds and wet places, not uncommon. Sharow mires ; ditches near Littlethorpe ; Ponds near Rifle Range, &c.

1107. **R. Acetosa.** Sorrel. Meadows, abundant.

1108. **R. Acetosella.** Sheep's sorrel. Dry places, common. Remarkably abundant at Plumpton Rocks.

1111. **Polygonum Convolvulus.** Black bindweed. Cornfields, abundant.

1113. **P. aviculare.** Knot-grass. Roadsides, fields, and waste ground, abundant. Several varieties occur, amongst which may be mentioned *vulgatum*, *agrestinum*, *arenastrum* (by Ure), and *microspermum*.

1116. **P. Hydropiper.** Biting persicaria. Wet places, abundant.

1117. **P. minus.** Small persicaria. Wet places. Near Ripon (Baines).

1118. **P. mite.** Lax-flowered persicaria. Wet places, rare. Ure Bank district (Lees, l. c.).

1119. **P. Persicaria.** Common persicaria. Waste ground and damp places, common.

1120. **P. lapathifolium.** Pale flowered persicaria. Waste ground and wet places, common.

1122. **P. amphibium.** Amphibious persicaria. Var. *b*, *terrestre* is apt to be a noisome weed occasionally.

1123. **P. Bistorta.** Snake-weed. Moist meadows and woods, local. Near the Training College in a field which wants draining; Fountains, &c.

1127. **Daphne laureola.** Spurge laurel. Woods, rare, and often doubtfully indigenous. Studley; Knaresborough (Baines).

1130. **Aristolochia Clematitis.** Birthwort. An alien sometimes found near old ruins. Studley district (Lees, l. c.).

1132. **Buxus sempervirens.** Box. Studley woods, naturalized.

1134. **Euphorbia Helioscopia.** Sun spurge. Gardens and waste ground, common.

1139. **E. Esula.** Leafy-branched spurge. Common in many of the older gardens near Ripon, and sometimes occurring as an escape in the neighbourhood.

1143. **E. Peplus.** Petty spurge. Cultivated ground, abundant.

1144. **E. exigua.** Dwarf spurge. Cornfields, common.

1146. **Mercurialis perennis.** Mercury. Woods, abundant.

1149. **Parietaria diffusa.** Pellitory. Rocks and old walls. Very abundant at Fountains Abbey, and on the cliffs near Knaresborough.

1150. **Urtica dioica.** Nettle. Waste ground, abundant.

1152. **U. urens.** Small nettle. Waste ground, but generally found near a wall or building.

1153. **Humulus Lupulus.** Hop. Hedges, but doubtfully indigenous. Near Bridge Hewick; Fountains Abbey (on rocks); Newby district (Lees, l. c.).

1154. **Ulmus suberosa.** Cork-barked elm. Woods and hedges, not common.

1155. **U. montana.** Wych elm. Woods and hedgerows, the commoner species.

1156. **Quercus robur.** Oak. Woods, common.

1157. **Castanea vulgaris.** Chestnut. Parks and woods, not indigenous.

1158. **Fagus sylvatica.** Beech. Woods, common.

1159. **Corylus avellana.** Hazel. Woods, abundant.

1161. **Alnus glutinosa.** Alder. Wet places, and by streams, common.

1162. **Betula alba.** Birch. Woods, not common. There is a considerable grove of birch at North Stainley, and it is common at Leckby Carr.

1165. **Populus alba.** White poplar. Woods, preferring a moist situation. Not indigenous.

1168. **P. nigra.** Black poplar. Woods, not indigenous.

1170. **Salix fragilis.** Brittle willow. Damp places, common.

1172. **S. alba.** White willow. Damp places, not uncommon.

1173. **S. undulata.** Ure Banks district (Lees, l. c.).

1175. **S. purpurea.** Purple willow. Marshes and river-sides, common. Ure and Skell Banks; Pilmoor Carr, Sharow, &c.

1177. **S. rubra.** Banks of Skell; Hackfall district (Lees, l. c.).

1178. **S. viminalis.** Common osier. River banks, common.

1179. **S. stipularis.** Ure Banks district (Lees, l. c.).

1181B. **S. rugosa.** Ure Banks district (Lees, l. c.).

1183. **S. cinerea.** Grey willow. Wet places, common.

1199. **Pinus sylvestris.** Scotch fir. Woods, generally planted; spontaneous at Leckby Carr.

1203. **Taxus baccata.** Yew. Flourishes in woods, especially near Fountains, with unusual luxuriance in this neighbourhood.

MONOCOTYLEDONES.

1204. **Typha latifolia.** Bullrush. Ponds and river banks, not uncommon. Sharow mires; in a ditch near Hewick Bridge, &c.

1206. **Sparganium ramosum.** Bur-reed. Ponds, &c., common.

1207. **S. simplex.** Unbranched bur-reed. In similar places to, but much rarer than the foregoing. Ure Banks below Hewick Bridge.

1209. **S. minimum.** Least bur-reed. Ponds, &c. Ure Banks district (Lees, l. c.); near Copt Hewick. The remarks by Baines under the name *S. natans* ("Staveley Carrs and ponds near Ripon") may not improbably refer to this species.

1210. **Acorus calamus.** Sweet flag. Ponds and ditches. "Lake at the slip above Kirby Knowle, near Thirsk." I am unable to say whether the plant still grows there.

1211. **Arum maculatum.** Cuckoo-pint. Hedges and woods, common.

1213. **Lemna trisulca.** Ivy-leaved duckweed. Stagnant water, not common. Sharow mires ; Bishopton (Plues).

1214. **L. minor.** Common duckweed. Stagnant water, common.

1216. **L. polyrhiza.** Greater duckweed. Stagnant water, rare. Sharow mires.

1218. **Potamogeton natans.** Broad-leaved pond-weed. Still water, common.

1227. **P. lucens.** Transparent pond-weed. Still parts of Ure, not common.

1230. **P. perfoliatus.** Perfoliate pond-weed. Still water and ponds, not uncommon.

1231. **P. crispus.** Curled pond-weed. Not uncommon in Ure ; plentiful in the canal.

1232. **P. densus.** Close-leaved pond-weed. River Ure, common.

1234. **P. acutifolius.** I found what I take to be this plant, from its flattened stem and acuminate leaves, in one of the ditches between the mouth of the canal and Newby Ferry. Should be looked for.

1237. **P. pusillus.** Little pond-weed. Ponds, &c., not uncommon. Sharow mires, &c.

1239c. **P. flabellatus.** This is one of the rarer plants found near Ripon. It will be seen in considerable plenty in the Ure, especially below Hewick Bridge, in rapidly running water, forming sometimes considerable patches or beds.

1241. **Zannichellia palustris.** Horned pond-weed. Still water, common. River Ure, and canal ; Sharow mires, &c.

1242. **Z. pedicillata,** with long pedicels, occasionally found in all the above places.

1249. **Triglochin palustre.** Arrow-grass. Boggy places, not common. Near Sharow mires; Marfield, Masham (Mrs. Berkeley).

1251. **Scheuchzeria palustris.** Leckby Carr (Baines); this writer states (1840) that he looked for this plant for five seasons without seeing a single plant. After this it would seem to have re-appeared. Mr. Lees found a specimen, and a certain nursery gardener not far from the place found, I am told, several, and removed them all. Since then all efforts to find it have been in vain. Mr. Lees, the Rev. W. Fowler, and I sought the place minutely in 1881, guided by Mr. Lees' previous experience. Since this, I went several times the same year, paying special attention to the spot where Mr. Lees found his specimen, but am reluctantly obliged to consider it extinct. The first record of this plant at Leckby was that of the Rev. J. Dalton, in July, 1820. It is possible that it may re-appear, but no botanist must *expect* to find it again.

1253. **Alisma plantago.** Water plantain. Stiller parts of the Ure, ponds, &c. Not rare.

1254. **A. ranunculoides.** Lesser water plantain. Ponds and ditches, occasional. Copgrove and Boroughbridge district (Baines and Lees); Pilmoor Carr, near Sharow; on the common at Ripon (Baines).

1257. **Butomus umbellatus.** Flowering rush. Ponds, ditches, and slow streams, rare. Ure near Newby (Miss Morton); near Masham (introduced); it also grows in small quantity in a pond near Ripon, whereof I forbear to specify the place exactly.

1258. **Hydrocharis morsus-ranæ.** Frog-bit. I am not sure whether this plant is found near Ripon still. It formerly grew in a pond in the Bull Close, as Miss Morton informs me, from whence I have seen undoubted specimens. It also grew in the Staveley

district, but the flora of that region has been completely modified since the draining of Staveley Carrs, and I do not know whether this plant survives or not.

1260. **Elodea canadensis.** Water thyme. Still and running water, abundant. This plant seems to be materially decreasing in abundance in the Ripon district.

1263. **Orchis pyramidalis.** Pyramidal orchis. Pastures, &c., on limestone, common. Near Masham ; Thieves' Gill ; Newby ; remarkably fine and plentiful in the field next Mackershaw wood ; &c.

1264. **O. ustulata.** Chocolate-tipped orchis. Fields, preferring those on limestone, common. Clotherholme ; Thieves' Gill ; Bridge Hewick ; near Tanfield ; &c.

1268. **O. Morio.** Green-winged orchis. Meadows and pastures, those on limestone preferred, not uncommon, and nearly always found in company with *O. ustulata ;* for which see the localities.

1269. **O. mascula.** Early orchis. Moist meadows and (occasionally) woods, common.

1271. **O. incarnata.** Light marsh orchis. Marshy fields, uncommon. Marfield, Masham ; Sharow mires (scarce) ; Cowmire, near Galphay (Miss Morton). May be easily distinguished from the following by the bracts, all of which exceed the flowers ; by the leaves, which are gradually narrowed from the base, and hooded at the tip ; and by the colour of the flowers, which are much lighter, sometimes approaching a flesh colour.

1272. **O. latifolia.** Dark marsh orchis. Marshy fields. Baines calls this plant common in Yorkshire, being unaware of the difference between this and the foregoing. I think I may safely say that every marsh orchis found near Ripon will be found to be of species 1271.

1273. **O. maculata.** Spotted orchis. Damp woods and pastures, common. I may mention, for the sake of the less experienced botanists, that it is not safe to put down every orchis that has spotted leaves under this species. The name is a misleading one, as the spotted orchis may occasionally be found with unspotted leaves, and species 1263, 1271, and 1272 with spotted leaves; 1271 very rarely.

1274. **Gymnadenia conopsea.** Fragrant orchis. Fields, especially on limestone, not uncommon. Marfield, Masham; near Clotherholme; Thieves' Gill; field near Mackershaw (very large and fine).

1276. **Habenaria viridis.** Frog orchis. Sloping fields, not uncommon, but easily overlooked, owing to its insignificant appearance. Quarry moor; field next Mackershaw wood; hilly pastures above Masham, &c.

1278. **H. chlorantha.** Large butterfly orchis. Moist pastures and copses, not common. Woods near Masham, in small quantity; field near Mackershaw wood.

1281. **Ophrys apifera.** Bee orchis. Fields on limestone, pretty common, but often not flowering; it has a habit of flowering sparingly one year, abundantly the next, and then hardly flowering at all for the next year or two. This has often been remarked upon (see Science Gossip for November and December, 1880, and January, 1881). Abundant near Ripon in 1879, hardly to be found 1880 and 1881.

1283. **O. muscifera.** Fly orchis. Damp woods and fields on limestone, and generally in very small quantity. Mackershaw; woods near Masham; Newby district (Lees, l. c.); Belmonde wood, Knaresborough (Baines).

1284. **Spiranthes autumnalis.** Lady's tresses. Dry calcareous places, local. Is found in plenty at Quarry

Moor, but I have not seen it elsewhere near Ripon, though Dr. Lees records it from the Newby district.

1288. **Listera cordata.** Mountain tway-blade. Turfy moors, local. Is recorded by Baines from Rombalds Moor, also from "near the waterfall at Lord Grantley's lakes on Sawley moor"; also by Mr. Lees from the Studley district, which may refer to the same place.

1289. **L. ovata.** Tway-blade. Woods and meadows, common.

1290. **Neottia nidus-avis.** Bird's nest. Shady woods, local, and having a preference for beech trees. Mackershaw; recorded by Mr. Lees (l. c.) from Hackfall and Newby districts.

1291. **Epipactis latifolia.** Helleborine. Woods, common. Mackershaw; Hackfall; Newby district (Lees, l. c.).

1294. **E. palustris.** Marsh helleborine. Wet meadows and marshes, local. I found one plant in the Marfield near Masham, where it was subsequently found by Mrs. Berkeley; Miss Morton records it in fair abundance from Cowmire, near Galphay, whence I have seen specimens.

1297. **Cephalanthera grandiflora.** Large-flowered helleborine. Woods. Mrs. Berkeley shewed me in 1881 a finished drawing of a helleborine she had found in Hackfall, which can only have been this plant. I did not see the specimen itself, as it had been given away, but there can be little doubt on the point, for Mrs. Berkeley's coloured drawings are of unusual excellence. This plant should be carefully looked for.

1306. **Iris fœtidissima.** Fœtid iris. "Bank at Little Nunwick, by Ripon" (Mr. Brunton, in 1816). Baines (1840) gives the additional particulars, "behind Clark's house"; Mr. Lees records it (doubtless on these authorities), and believes that it may still be

found. Miss Morton, however, who would be certain to see it if it still existed, has sought it for years there in vain ; nor did I see it.

1307. **I. Pseud-acorus.** Yellow iris. Common in all wet places.

1309. **Crocus vernus.** Spring crocus. An alien. Studley district (Lees, l. c.).

1311. **Narcissus Pseudo-narcissus.** Daffodil. The large double garden variety may be found as an occasional escape by stream sides ; I believe that the wild variety is to be found on Galphay moor, whence Baines records it.

1313. **N. biflorus.** Pale narcissus. Newby district (Lees, l. c.). Not indigenous.

1316. **Galanthus nivalis.** Snow-drop. Woods and stream-sides, common ; almost invariably double. This must be in some degree attributable to the soil, as single snow-drops in gardens near Ripon tend to become double in a year or two. Mackershaw ; Skell and Laver banks ; Skelton woods ; &c.

1317. **Tamus communis.** Black bryony. Hedges, common.

1318. **Paris quadrifolia.** Herb paris. Woods, local, but not uncommon. Commonest in the woods by the Laver, and in a few woods near Masham.

1321. **Polygonatum multiflorum.** Baines records this from Studley and Fountains ; and there it may yet be found in plenty—in garden beds at the Lodges.

1322. **P. officinale.** Baines records this from Studley and Fountains.

1323. **Convallaria maialis.** Lily-of-the-valley. Woods, local. Mackershaw ; Aldfield ; Thornton (Plues) ; in large beds in Brafferton Spring wood near Pilmoor.

1330. **Gagea lutea.** Yellow star-of-Bethlehem. Copses, especially with a south aspect. Red Bank ; opposite

Littlethorpe ; near Sharow mires ; near North Stainley (Rev. R. A. Summerfield).

1332. **Ornithogalum umbellatum.** Common star-of-Bethlehem. Said by Baines to grow in meadows near Ripon. Not indigenous. Being plentiful in shrubberies and older gardens, occasionally occurs as an escape.

1336. **Scilla nutans.** Blue-bell, hyacinth. Woods and hedges, abundant.

1339. **Allium scorodoprasum.** Sand leek. This uncommon plant occurs by hedge-sides, in woods, &c., with unusual abundance near Ripon. Sharow ; Bridge Hewick ; near Fountains village ; Mackershaw ; &c.

1342. **A. oleraceum.** Field garlic. In similar places to the last, and perhaps even more abundant. Mackershaw ; Clotherholme ; Bishopton ; Sharow ; Sleningford ; Newby, &c.

1346. **A. ursinum.** "Ramsons." Woods, abundant.

1350. **Colchicum autumnale.** Meadow saffron. Meadows, local, but common. Near the palace, Ripon ; Thieves' Gill ; Givendale ; Newby ; &c.

1352. **Luzula Forsteri.** Forster's wood-rush. Leckby Carr.

1353. **L. pilosa.** Hairy wood-rush. Woods, common.

1354. **L. sylvatica.** Great wood-rush. Damp woods, local. Hackfall, and woods near Masham.

1355. **L. campestris.** Field wood-rush. Pastures, woods, and lawns, abundant.

1356. **L. multiflora.** Many-flowered wood-rush. Marshes and heaths, local. Hutton Moor ; Masham ; Leckby Carr (var. *b. congesta*).

1365. **Juncus conglomeratus.** Common rush. Damp places, common.

1366. **J. effusus.** Soft rush. Wet ground, common.

1368. **J. glaucus.** Hard rush. Wet places, pastures, and roadsides, common.

1371. **J. obtusiflorus.** Blunt-flowered rush. Marshes, rare. In small quantity at Sharow mires.

1372. **J. acutiflorus.** Sharp-flowered rush. Marshy places, not common. Marfield, Masham ; Hutton Moor.

1373. **J. lamprocarpus.** Shiny-fruited rush. Marshy places, common. Tanfield ; Hutton Moor ; Hackfall (Miss Morton).

1377. **J. bufonius.** Toad-rush. Damp places, common. Hutton Moor ; Pilmoor Carr near Sharow ; &c.

1380. **J. squarrosus.** Moor rush. I have only remarked this species on Hutton Moor, where it is not uncommon. Miss Morton records it from Dallow gill and Brimham.

1383. **Schœnus nigricans.** Black bog-rush. Marshes, rare. Marfield, Masham ; Sharow mires ; Cowmire (Miss Morton).

1384. **Cladium Mariscus.** Twig-rush. Bogs and ponds, rare. Sharow mires ; Baines records it from the Knaresborough neighbourhood.

1386. **Rhynchospora alba.** White beak-rush. Bogs, local. Leckby Carr in abundance, whence Baines also records it ; Hutton Moor ; &c. The nearest place to Ripon where it may be found, is in a small marshy place in a field on the south side of the Ure near the North Bridge, in company with *Carex stricta* and *C. ovalis*.

1389. **Scirpus acicularis.** Little spike- (or club-) rush. Wet sandy places, rare. Hutton Moor and Pilmoor Carr, Sharow (in the latter spot very rare).

1390. **S. palustris.** Creeping club-rush. Wet places, common.

1393. **S. pauciflorus.** Chocolate-headed club-rush. Moors. Brimham Rocks (Miss Morton).

1394. **S. cæspitosus.** Tufted club-rush. Turfy moors. Brimham Rocks (Miss Morton).

1398. **S. setaceus.** Bristle club-rush. Wet gravelly places, uncommon. Hutton Moor ; Swinton.

1400. **S. lacustris.** Great club-rush. Margins of ponds, &c., local. Queen Mary's Dubb ; Hutton Moor ; large pond near Marfield, Masham ; &c.

1406. **S. sylvaticus.** Wood club-rush. Wet woods, uncommon. Hackfall, whence Miss Morton also records it ; Studley district (Lees, l. c.).

1408. **Eriophorum vaginatum.** Hare's-tail cotton-grass. Marshes and moors. Leckby Carr, abundant ; Tanfield Carr (Baines) ; Ox Close, near Ripon (Baines).

1409. **E. angustifolium.** Common cotton-grass. Marshes, &c. Plentiful at Leckby Carr and at Whitemere, on Hutton Moor.

1411. **E. latifolium.** Broad-leaved cotton-grass. Said by Baines to occur at Copgrove and Gormire under Hambledon.

1413. **Carex dioica.** Dicœcious sedge. Wet places. "Near Ripon" and "near Copgrove" (Baines). I have only found it in a small marsh near Wormald Green station ; Laver district (Lees, l. c.).

1414. **C. pulicaris.** Flea sedge. Bogs and moist meadows. Whitemere, Hutton Moor ; plentiful in the field next Mackershaw wood.

1418. **C. divisa.** Marsh sedge. "Near Copgrove. B.G." in Baines.

1419. **C. disticha.** Soft brown sedge. Bogs. Marfield, Masham ; Sharow mires (in small quantity).

1421. **C. teretiuscula.** Smaller panicled sedge. Bogs. Hutton Moor ; near Copgrove (Baines) ; Tanfield Hall Carr (Baines), where I have seen it ; "bogs in Fairfield woods, near Ripon, B.G." (Baines).

1423. **C. paniculata.** Greater panicled sedge. Bogs, rare. Sharow mires.

1424. **C. vulpina.** Great rough sedge. Bogs and wet places. Sharow mires ; near Hutton Conyers.

1425. **C. muricata.** Greater prickly sedge. Bogs and hedge banks. Common in hedge banks near Leckby Carr.

1426. **C. divulsa.** Grey sedge. Moist fields and woods. Hackfall; Studley district (Lees, l. c.).

1427. **C. stellulata.** Lesser prickly sedge. Bogs. Marfield, Masham; and Whitemere, Hutton Moor, abundant.

1429. **C. axillaris.** Clustered sedge. Wet bogs. Hutton Moor; Newby district (Lees, l. c.); Sharow mires (not to be found there now); near Copgrove (Baines).

1431. **C. elongata.** Elongated sedge. Wet fields and woods. Aldwark, near Boroughbridge (Baines).

1433. **C. curta.** White sedge. Wet bogs. Leckby Carr, and Whitemere, on Hutton Moor, in abundance; Ox Close, Ripon (Baines); Lakes on Sawley Moor (Baines); Aldwark, near Boroughbridge (Baines).

1434. **C. ovalis.** Oval-headed sedge. Bogs and pond sides. Whitemere, Hutton Moor; Leckby Carr; Sharow mires (in small quantity); in a marshy field below Blois Hall, Sharow; in a small pond near the North Bridge, Ripon (see under *Rhynchospora alba*).

1438. **C. stricta.** Glaucous sedge. Bogs, rare. Flowers in April and May. Sharow mires; pond near North Bridge (see *C. ovalis*).

1439. **C. acuta.** Slender-spiked sedge. Wet places. Sharow mires; ponds by the Ure, on the south side, above the North Bridge; "near Ripon and Copgrove" (Baines), which is slightly vague.

1442. **C. vulgaris.** Tufted sedge. Marshes and wet meadows, common.

1443. **C. glauca.** Glaucous heath sedge. Woods, pastures, and banks—wet or dry—common. Abundant on the railway banks near Hutton Conyers.

1445. **C. limosa.** Mud sedge. Muddy bogs. Baines records it from Tanfield Hall Carr, and Leckby Carr, in neither of which places have I found it.

1447. **C. digitata.** Finger sedge. Dry banks, on limestone preferred, in woods. Mackershaw; Hackfall.

1450. **C. pilulifera.** Round-spiked sedge. Marshes and damp rocks. Hutton Moor; Marfield, Masham; Plumpton rocks.

C. saxumbra (Lees). A species new to science, discovered at Plumpton rocks, near Knaresborough, in the autumn of 1880, by Mr. F. A. Lees; its affinities are apparently with *C. muricata* and *C. pilulifera*, as I gather from a series of specimens kindly sent me by Mr. Lees. I am not sure whether the name *saxumbra* quite fulfils the requirements of Latin etymology.

1452. **C. præcox.** Early sedge. Heaths, pastures, and dry banks, common, flowering early in April.

1454. **C. pallescens.** Pale sedge. Marshes and moist meadows. Marfield, Masham; Pilmoor Carr, Sharow; field next Mackershaw wood; Leckby Carr (Baines).

1455. **C. panicea.** Pink-leaved sedge. Wet fields and woods. Common in marshy fields on Hutton Moor; Cayton Gill, in woods. I must confess that I have never been able to perceive the pink colour of the leaves.

1459. **C. pendula.** Great drooping sedge. Damp woods, seeming to enjoy especially boggy places where the soil is impregnated with iron. Hackfall, where it grows in a bog of a bright red rust colour; Boroughbridge district (Lees, l. c.).

1460. **C. strigosa.** Broad-leaved wood sedge. Woods, rare. Hackfall, and Studley, a small patch in each place. Baines records it from "Magdalene Banks, Hackfall." As far as my information serves me, these banks are on the same side of the river as Tanfield Hall; but I found it on the Mickley and Grewelthorpe side.

1462. **C. sylvatica.** Narrow-leaved wood sedge. Woods, common. Hackfall; Clotherholme; Mackershaw; &c.

1463. **C. lævigata.** Smooth-beaked sedge. Wet woods and marshes. Mr. Lees records it from the Laver banks district (l. c.).

1464. **C. binervis.** Green-ribbed sedge. Heaths and moors. Swinton; Sawley moor (Baines); Brimham rocks (Baines); Copgrove (Baines).

1467. **C. fulva.** Tawny sedge. Wet moors, fields, and woods. Hutton Moor; Copgrove (Baines); Hackfall.

1469. **C. flava.** Yellow sedge. Marshes and wet woods, common. Marfield, Masham; Mackershaw; Cayton Gill.

1470. **C. Œderi.** Œderian sedge. Recorded by Baines from "near Ripon," and Gormire lake, under Hambledon; and by Miss Morton from Cowmire, near Galphay. The true *C. Œderi* is seldom found far from the sea coast, and it is probable that all these records refer to a stunted growth of *C. flava* var. *lepidocarpa.*

1471. **C. filiformis.** Slender-leaved sedge. Bogs, rare. Whitemere, on Hutton Moor; Leckby Carr; in the former place abundantly, in the latter sparingly.

1472. **C. hirta.** Hairy sedge. Bogs, &c. Sharow mires; Marfield, Masham; Newby district (Lees, l. c.). I found a very curious growth of this plant by a brook near Wath; stem and spike together were only about two inches in height.

1473. **C. Pseudo-cyperus.** Cyperus sedge. "In a bog on the south side of the Ure near Ripon" (Baines). No one has seen it of late years.

1474. **C. paludosa.** River sedge. Stream and pond sides, not common. Sparingly on Ure Banks; Hackfall; Boroughbridge district (Lees, l. c.).

1475. **C. riparia.** Greater river sedge. River and pond sides, common. Abundant by Ure, &c.

1476. **C. ampullacea.** Bottle sedge. Marshy places. Sharow mires; Hackfall.

1477. **C. vesicaria.** Bladder sedge. Marshy places, not common. Pilmoor Carr, Sharow; Marfield, Masham;

Leckby Carr; Copgrove (Baines); Gormire under Hambledon (Baines).

1488. **Anthoxanthum odoratum.** Sweet vernal grass. Meadows and pastures, abundant.

1489. **Digraphis arundinacea.** Reed canary grass. Ponds and wet places, common.

1490. **Phalaris canariensis.** Canary seed. Occurs occasionally round Ripon as an escape.

1492. **Alopecurus fulvus.** Tawny fox-tail grass. Wet margins of ponds, rare. Pilmoor Carr, near Sharow.

1493. **A. geniculatus.** Angular fox-tail grass. Ponds and wet fields, common.

1495. **A. pratensis.** Common fox-tail grass. Meadows and pastures, abundant.

1498. **Phleum pratense.** Timothy-grass. Meadows, abundant. Var. *b. nodosum*, with a tuberous base to the stem, may be found in plenty at Sharow mires.

1506. **Agrostis Spica-venti.** Silky bent-grass. Recorded by Baines from several places in Yorkshire, including Copgrove and "Stump Cross field" near Boroughbridge; possibly a mistaken identity.

1509. **A. canina.** Brown bent-grass. Heaths, &c. I have only seen it on Hutton Moor, but it doubtless occurs in other places.

1510. **A. alba.** Fiorin grass. Pastures and waste places, common.

1511. **A. vulgaris.** Common bent grass. Common.

1514. **Calamagrostis Epigeios.** Wood reed. Moist woods, local. Aldfield; Studley and Boroughbridge districts (Lees, l. c.).

1515. **C. lanceolata.** Small reed. Damp woods, pond sides, and hedges, rare. "Ripon" and "Copgrove" (Baines). I have not heard of its recent occurrence.

1517. **Phragmites communis.** Common reed. Ponds, ditches, and stream sides, common. Almost as beautiful for winter house decoration as the Pampas

grass (*Gynerium argenteum*), and, like that plant, should be gathered for the purpose before it is fully out.

1518. **Milium effusum.** Millet-grass. Damp woods, not uncommon. Woods, on Hutton Moor; Swinton Burn.

1520. **Aira cæspitosa.** Common hair-grass. Wet meadows and woods, common.

1523. **A. flexuosa.** Wavy hair-grass. Dry waste places, not uncommon. Miss Morton found it in great abundance at Brimham Rocks.

1524. **A. caryophyllea.** Silver hair-grass. Dry waste places, common.

1526. **Avena flavescens.** Yellow oat-grass. Dry fields and hedge banks, common.

1527. **A. pubescens.** Downy oat-grass. Fields, hedge banks, and edges of woods. More common than in most places.

1530. **A. fatua.** Wild oat. Cornfields, local. Most abundant on the worse managed farms, and is a fair test of farming.

1531. **A. elatior.** Common oat-grass. Fields and hedge rows, common.

1532. **Holcus mollis.** Creeping soft-grass. Woods and waste places, common.

1533. **H. lanatus.** Downy soft-grass. Woods, meadows, and waste places, common.

1534. **Triodia decumbens.** Heath-grass. Moors and dry waste places, not common. Between Grewelthorpe and Swinton, on common-like land by the road; Brimham Rocks (Miss Morton).

1536. **Molinia cærulea.** Purple moor-grass. Wet moors or dry waste ground, uncommon. Hutton Moor; Hambledons; Brimham Rocks (Miss Morton).

1537. **Melica nutans.** Wood melic-grass. Shady woods, nearly as common as the following. Mackershaw; Clotherholme; Hackfall; &c.

1538. **M. uniflora.** Common melic-grass. Woods and hedge banks, common.

1539. **Catabrosa aquatica.** Water whorled grass. Wet places, common. Sharow mires ; by the canal ; &c.

1540. **Glyceria fluitans.** Floating sweet grass. Pools and marshes, common.

1542. **G. aquatica.** Water sweet grass. Pond sides and marshy fields, not uncommon. Sharow mires, &c.

1547. **Sclerochloa rigida.** Hard sweet grass. Dry places and old walls, occasional. Fountains ; Hackfall, on rocks.

1549. **Poa annua.** Annual meadow-grass. Fields, abundant.

1558. **P. pratensis.** Smooth meadow-grass. Fields, common.

1559. **P. trivialis.** Rough meadow-grass. Fields, common.

1560. **Briza media.** Quaking grass. Meadows, local, but in plenty where it occurs.

1562. **Cynosurus cristatus.** Crested dog's-grass. Dry fields, abundant.

1564. **Dactylis glomerata.** Cock's-foot grass. Meadows, common.

1568. **Festuca sciuroides.** Barren fescue grass. Walls and waste ground. Fountains Abbey ; Ellershaw Hill (Baines) ; of the other record in Baines—" Hutton Moor, two miles east of Ripon"—I can make nothing. Hutton Moor is north of Ripon.

1569. **F. ovina.** Sheep's fescue grass. Dry woods and pastures, not uncommon. Plentiful about Masham and Swinton ; Miss Morton records it from Brimham Rocks. The viviparous form occurs on the Hambledon Hills.

1570. **F. rubra,** var. *duriuscula.* Hard fescue grass. Fields and waste ground, common.

1572. **F. elatior.** Tall fescue grass. Wet fields and wood-sides. Near Leckby Carr (Baines) ; Sutton under Hambledon (Baines).

1573B. **F. loliacea.** Spiked fescue grass. "Meadows near Ripon" (Baines).

1574. **Bromus giganteus.** Giant brome grass. Woods and hedge banks, not uncommon. Clotherholme; Mackershaw; &c.

1579. **B. sterilis.** Barren brome grass. Hedge banks and fields, common.

1580. **B. secalinus.** Rye brome grass. In corn-fields. Laver district (Lees, l. c.).

1581. **B. racemosus.** Smooth brome grass. Fields and waste places, common.

1583. **B. mollis.** Soft brome grass. Fields and waste places, very common.

1585. **Brachypodium sylvaticum.** False brome grass. Woods and hedges, not uncommon.

1586. **B. pinnatum.** Heath brome grass. Hedge-rows and dry places on limestone. Newby district (Lees, l. c.).

1587. **Triticum caninum.** Fibrous-rooted wheat-grass. Banks and hedges, not uncommon, and widely distributed.

1588. **T. repens.** Couch-grass. Fields and waste places, too abundant.

1592. **Lolium perenne.** Rye grass. Meadows and waste ground, abundant.

1594. **L. temulentum.** Darnel. Corn-fields. Hooker (Stud. Flora, p. 485) calls this "common." I was curious on this point, and for two seasons looked for this plant in every corn-field round Ripon with great diligence, but only found one odd plant in a corn-field near Blois Hall in 1881. Mr. Lees records it from the Boroughbridge district.

1597. **Hordeum sylvaticum** (*Elymus europæus* in Baines). Wood barley. Baines records it from Hackfall. I did not find it myself, but saw specimens which had been gathered there by Miss Morton.

1598. **H. pratense.** Meadow barley. Grass fields, very local, but usually in some abundance where it does occur. Near Ripon, I only found it in a field near the north bridge (Ripon park) ; and, with Miss Morton, in the field under Mr. Tetley's house, by the river, at Bridge Hewick.

1599. **H. murinum.** Wall barley. Old walls and dry banks. Much rarer near Ripon than the last. My notes only record it from the Castle Hill, Richmond, with *Sclerochloa rigida*.

1601. **Nardus stricta.** Mat-grass. Heaths and dry pastures, rare. I have only found it on Hutton Moor and on the hills beyond Masham ; Miss Morton records it from Brimham Rocks.

ACOTYLEDONES VASCULARES.

1606. **Pteris aquilina.** Bracken. Woods and heaths, common.

1608. **Lomaria spicant.** Hard fern. Woods, not very common. Fountains and Aldfield ; Hackfall. I must raise my humble protest here against the Latinity of the specific name of this plant. The London catalogue ought certainly not to lend authority to the continuation of such base-born words as "spicant" and "ceterach," no matter what their priority, which are neither Latin, Latinised Greek, nor anything else. Babington very justly substitutes *boreale* for "spicant."

1609. **Asplenium Ruta-muraria.** Wall-rue spleen-wort. Old walls, not uncommon. Especially abundant on the wall by the road side through Tanfield village, and at Fountains.

1612. **A. Trichomanes.** Maiden-hair spleen-wort. Old walls and rocks, not uncommon. Fountains.

1616. **A. Adiantum-nigrum.** Black spleen-wort. Rocks and old walls. Knaresborough (Baines).

1617. **Athyrium Filix-fœmina.** Lady fern. Damp woods, not uncommon.

1620. **Scolopendrium vulgare.** Hart's-tongue. Rocks and old walls. Hackfall; Fountains; very abundant on the cliffs near Gormire; Knaresborough (Baines).

1623. **Cystopteris fragilis.** Bladder-fern. Old walls and limestone rocks, rare. Near Cayton Gill (I do not feel myself called upon to be more definite, as people are apt to be so selfishly rapacious with regard to ferns, and my information might be made an ill use of); near the dropping well at Knaresborough (Baines).

1627. **Aspidium aculeatum.** Prickly shield fern. Damp woods, not common. Studley (whence Baines also records it); Hackfall. The variety *b. lobatum* occurs in copses near Masham.

1629. **Nephrodium Filix-mas.** Male fern. Woods and banks, common.

1631. **N. cristatum.** Crested shield fern. Plumpton Rocks, Knaresborough (Baines).

1633. **N. spinulosum.** Prickly-toothed shield fern. Marshy woods, rare. Abundant at Leckby Carr; scarce at Hackfall.

1634. **N. dilatatum.** Broad prickly-toothed shield fern. Damp woods, common.

1635. **N. æmulum.** Recurved prickly-toothed shield fern. Shady rocks. In small quantity at Hackfall; also recorded by Mr. Lees (l. c.).

1636. **N. Thelypteris.** Marsh fern. Wet muddy bogs, growing in greatest luxuriance when its rhizome is under water the greater part of the year; local, and very rare. In abundance at Sharow mires; Baines records it from Copgrove (where it may easily be extinct, owing to drainage); Mr. Lees records it from the Newby district (l. c.).

1637. **N. oreopteris.** Mountain shield fern. Heaths and

hilly woods, rare. Healey, near Swinton; Laver district (Lees, l. c.).

1638. **Polypodium vulgare.** Common polypody. Banks, walls, and old trees, frequent.

1639. **P. Phegopteris.** Beech fern. Shady mountain woods, preferring dampish situations. Hackfall.

1640. **P. Dryopteris.** Oak fern. Shady mountain woods. Hackfall.

1644. **Osmunda regalis.** Royal fern. Damp places. Baines records it from near Knaresborough. No fern has suffered more from tourists and robbers under the name of botanists than this. The ordinary tourist has, apparently, an idea that he can grow this fern in a flower pot in his window, wherefore he never fails to dig a plant or two up, and try. But ferns have worse enemies even than the tourist, bereft as he is of a conscience in the matter. I allude to that debased product of civilisation, that vile sort of poacher, the idle rascal who, too lazy to work honestly, learns the names of a few ferns (probably in the first place from a market gardener, who is, too often, of the same blood), and gains a sort of living by purloining roots of ferns by the hundred from every gentleman's woods within his reach, and advertising them in the 'Bazaar,' and similar publications, as "fine fern roots, ninepence a dozen." This trade ought to be as summarily dealt with as that in pheasant's eggs, and every land owner ought to preserve his ferns for posterity with the same care as he does his pheasants for himself. I have been extremely pleased to note for the last two years in the late Col. Crompton's woods a notice posted up that "owing to the wanton destruction of the flower and fern roots," trespassers would be promptly prosecuted. O! si sic omnes!—would that every one else would do the same. The disease is bad

enough, in all conscience, in the Ripon neighbourhood. I have met in Hackfall, a whole family, father, mother, and children, loaded with baskets of violet, fern, and other roots. No one would grudge the inhabitants of towns a few roots of plants they had a fair chance of cultivating in pots, but this wholesale work—especially with a view to selling the results—is shameful. I humbly commend these hints to the consideration of all Yorkshire land owners.

1645. **Ophioglossum vulgatum.** Adder's tongue. Damp mossy pastures, not uncommon, but easily overlooked. Copt Hewick ; Markington ; &c.

1647. **Botrychium Lunaria.** Moon-wort. Grows in similar places to the last, and is about as common. Copt Hewick ; Ingerthorpe and Markington ; near Mackershaw.

1653. **Selaginella selaginoides.** Least club-moss. Wet places on mountains. "On the top of Whitsun-cliff, near Thirsk" (Baines).

1658. **Equisetum arvense.** Corn horse-tail. Cornfields and damp meadows, common.

1660. **E. maximum.** Giant horse-tail. River banks and wet places, rare and local. River banks near Tanfield ; Boroughbridge district (Lees, l. c.).

1661. **E. sylvaticum.** Wood horse-tail. Damp woods, not common. Studley ; Hackfall.

1663. **E. limosum.** Smooth water horse-tail. Stagnant water, rare. In a pond near Tanfield Hall.

1664. **E. hyemale.** Rough water horse-tail. Damp banks and woods, especially by rivers, rare. By the Ure, near Tanfield and in Hackfall.

THE FATHERS OF YORKSHIRE BOTANY.

BY

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BEING

THE PRESIDENTIAL ADDRESS FOR 1883, DELIVERED AT BARNSLEY, MARCH 4TH, 1884.

I should like some day to see the different Natural History Associations in the North of England join hands and get together a readable sketch of the progress of Natural History in our six northern counties. For want of such a record I am afraid that the men of to-day know very little of the history of how and by whom the accumulated knowledge of which we have possession at the present time has been worked out and brought together. If the two thousand members of the Yorkshire Naturalists' Union had to go up for one of those examinations which are so common now-a-days, and the question was asked: 'Name the Yorkshiremen who have been eminent in Natural History up to the end of the eighteenth century, and give the titles of their principal writings,' I wonder how many of us would be able to score twenty-five per cent of the total attainable number of marks. I do not think that a great many would; and this state of things is almost inevitable from the nature of the case. Our sciences are so full of detail and they march forward so fast. A good paper is published in a periodical or in the report or transactions of some society; the pith of it is soon absorbed into some general work: in Botany, into a general flora of the island, like Hooker's or Babington's, or a handbook of some special order in the cryptogamia, or a record of localities into a county flora; and these are again condensed into the general epitomes of the botany of the whole

island, like Watson's 'Cybele Britannica' and 'Topographical Botany.' It is these general books which isolated workers buy, and only a few copies of the original memoir remain, laid aside upon the upper shelves of our great public libraries in the large towns and in London. When I had to fix a subject for this present address these considerations came into my mind, and as, living in London, I have at any rate a good opportunity of access to the original books and pamphlets if only I had time to spare to take advantage of my chances, I decided to take Scott's 'Old Mortality' for my example, and to spend my allotted hour this evening in an attempt to chisel out afresh the half effaced letters and clear away the moss that has grown upon the tombstones of some of our earlier predecessors.

To bring my task within anything like reasonable compass I must restrict myself entirely to the botanists, and perhaps on some future occasion of the same kind one of my successors will give us a similar sketch for zoology in general, or for ornithology, entomology, or conchology. The geologists are, I believe, at the present time preparing a series of biographies of their early workers. I will draw the line as regards time at the end of the eighteenth century, before which date the Linnæan nomenclature and terminology were universally received and accepted. It was in 1778 that Linnæus died, and in 1788 that the Linnæan Society was founded, the Linnæan collections having been brought to England by Sir J. E. Smith a few years previously; and before the end of the eighteenth century Teesdale and his coadjutors had already obtained a very full knowledge of the flora of the county.

Roughly speaking, we may classify the men with whom we have to deal in four groups. First, the early herbalists who were connected with the county, such as Ascham, Turner, and Johnson. Secondly, the local cotemporaries and correspondents of Ray and Dillenius, such as Lister, Thoresby, Willisel, Richardson, and Brewer. Thirdly, the early Linnæans, such as Fothergill, Salisbury, Teesdale, Knowlton, Tofield, Caley,

and the two Robsons. And fourthly, those who laid the foundation of our knowledge of the cryptogamic botany of the county, such as Bolton, Brunton, Teesdale, and Dalton.

So far as I am aware, the earliest record which we have of any botany in Yorkshire goes back to the middle of the sixteenth century. Anthony Ascham was a priest, and after receiving a liberal education was presented by Edward the Sixth to the living of Burniston near Bedale. In those days, and long afterwards, Astrology was a popular pursuit, and Ascham became one of its followers. He published several pamphlets on the subject, and in the year 1550 brought out a small book in duodecimo, of which the following is a copy of the title page :—'A Lyttel Herbal of the properties of Herbs, newly amended and corrected, with certain additions at the end of the boke, declaryng what herbs hath influence of certaine starres and constellations, whereby may be chosen the best and most lucky times and days of their ministration, according to the moon being in the signs of heaven, the which is daily appointed in the almanack, made and gathered in the year MDL, xii. Feb., by Anthonye Ascham, Physician.' The celebrated Roger Ascham, the tutor of Queen Elizabeth, belonged to the same district, his birthplace being Kirby Wiske, and lived at the same time, so that it is not unlikely they were relations. Roger Ascham's father was steward to one of the Scropes. Salisbury founded a genus of Amaryllidaceæ called *Aschamia* in memory of Anthony Ascham, but it is now merged into *Hippeastrum*.

The most distinguished of the English herbalists of the Tudor period was William Turner. He was a native of Morpeth and a student of Pembroke College, Cambridge, under the patronage of Sir Thomas Wentworth. Writing of Cambridge as it was in 1540, he says : 'Being yet a student of Pembroke Hall, whereas I could learn never one Greke, neither Latin nor English name, even amongst the physicians, of any herbe or tree, such was the ignorance at that time ; and as yet there was no English herbal, but one all full of unlearned caco-

graphies and falsely naming of herbes.' He became an ardent Protestant, a friend of Ridley and Latimer, and led a very troublous life. After being imprisoned by Bishop Gardiner, in the reign of Henry VIII, he fled to the continent, and at Bologna attended the lectures of Ghinus, who was the first professor who ever gave special lectures on botany at a medical school. At the accession of Edward VI Turner returned to England and was actively engaged both as a physician and divine. He was prebend of York in 1549 and 1550, and then was appointed Dean of Wells. His 'Libellus de re herbaria novus,' originally published in 1538, has recently been reprinted in fac-simile, by Mr. Daydon Jackson, the secretary of the Linnæan Society, and his 'Names of Herbes,' published in 1548, has been reprinted by Mr. Jas. Britten, of the British Museum. The first volume of his herbal was published at London in 1551, the second at Cologne, to which city he fled on the accession of Queen Mary, in 1562. He lived to return to England when Elizabeth came to the throne, and died in 1568, a few months after the publication of a third part of his herbal. He had a garden at Wells, where he resided as Dean, and speaks also of his garden at Kew. A genus, *Turnera*, was named after him by Plumier and Linnæus, and this has given its name to the natural order *Turneraceæ*.

The herbal of Fuchsius, of which I possess a copy, is two years earlier than Turner's, having been published at Lyons, in 1549. It is simply a series of rough woodcuts, with the names of the plants in five languages. After its author the well-known genus *Fuchsia* was named.

Next to Turner came Lobel, after whom an equally well-known genus, *Lobelia*, takes its name. He was of Flemish extraction, and came to England and settled in London early in the reign of Queen Elizabeth. His 'Stirpium Adversaria,' the first edition of which was published in 1570 and a second in 1605, is a considerable advance upon Turner, inasmuch as it contains the first rough rudiments of a natural scheme of classification.

John Gerard was cotemporary with Lobel. He was a native of Nantwich in Cheshire, and was born in 1545, and educated as a surgeon. He settled in London and obtained the patronage of the great Lord Burleigh, who at that time possessed the finest garden in the country. In 1596, Gerard published a list of the plants, nearly 1100 in number, which he had under cultivation in his own private garden in Holborn. A second edition of this, published three years later, is dedicated to Sir Walter Raleigh. His well-known 'Herbal, or General History of Plants,' a huge volume in folio, was published in 1597. It is founded on the Herbal of Dodonæus, and illustrated by blocks which had been already used in Holland by Tabernæmontanus. Gerard's book, unlike those of Turner and Lobel, was written in English and had a very wide circulation. Thirty-six years later, in 1633, a new and much improved edition of it was published by Thomas Johnson

Thomas Johnson, who was a native of Selby in Yorkshire, was the best botanist of his day. He became an apothecary in London and had a shop upon Snow Hill. The Society of Apothecaries was first incorporated in the early part of the reign of James I, and very soon their annual herborising became a regularly settled institution. Johnson's first publications give an account of two of their trips, one to Kent, in 1629, and the second to Hampstead Heath, in 1632. These are notable as being the first accounts of a botanical excursion published in England. Two years later he published his 'Mercurius Botanicus,' the result of a journey through Oxford to Bath and Bristol, and home again by Southampton, the Isle of Wight, and Guildford; and in 1641 the account of a trip to Wales. In 1633 he brought out his amended edition of Gerard's Herball, a book which merits fully the encomium bestowed upon it by the great Swiss naturalist, Haller :— 'Dignum opus et totius rei herbariæ eo ævo notæ compendium.' It contains a notice of more than 800 plants not in Gerard's, and upwards of 700 new figures in addition to Gerard's 2000. Then the Civil War broke out and Johnson threw himself into

it with ardour, taking the side of the royalists. I have not time now to tell once again the story, which those who do not know it already may read in Clarendon or Carlyle, of how fiercely Basing-house was attacked by the parliamentary forces and how bravely it was defended. Our great Yorkshire herbalist was in the thick of the fight as a lieutenant-colonel on the royalist side, and I give the sequel in the words of a sympathising contemporary :—'Going with a party on the 14th of September, 1644, to succour certain of the forces belonging to that house, which went to the town of Basing to fetch provisions thence, but were beaten back by the enemy, headed by that notorious rebel, Colonel Richard Norton, he received a shot in the shoulder, of which he died in a fortnight after. At which time his worth did justly challenge funeral tears; being then no less eminent in the garrison for his valour and conduct as a soldier, than famous through the kingdom for his excellency as a herbalist and physician.' Robert Brown has named in his memory the genus *Johnsonia*, and from it is taken the name of one of the tribes of Liliaceæ.

Parkinson, the author of two large and well-known herbals, who was a cotemporary of Gerard and Johnson, I pass over, as he had no connection with Yorkshire.

The 'Phytologia Britannica' of William How, published in 1650, a duodecimo of 133 pages, is the first attempt at a special catalogue of English plants. How had a correspondent at Barnsley, a Mr. Stonehouse, who contributed to it a notice of several localities. The Civil war, of course, whilst it lasted, left men little opportunity or inclination for the sciences, but in the more peaceful days that followed the restoration of the monarchy they revived. The Royal Society was first granted a Charter of Incorporation by Charles II in 1665. The first paper in its 'Transactions' is an account of Campani's improved telescope; the second, by Hook, on a spot on one of the belts of Jupiter; the fourth an account of a series of experiments on temperature, by the Honble. Robert Boyle; and

soon follows a notice of Hook's 'Micrographia, or the physiological description of minute bodies made by magnifying-glasses,' the book in which the microscope was first applied to the study of the vegetable cell. 'Harvey's Treatise on the Circulation of the Blood' had been published in 1628. Newton's 'Principia' and his discovery of universal gravitation was half-a-century later, in 1686.

During the last fifty years of the seventeenth century, all through the reigns of Charles II, James II, and William and Mary, the progress of botany is closely connected with the name of John Ray; and it is to him more than to any one else that we are indebted for its establishment as a regular department of science. Ray was the son of an Essex blacksmith, and was born in 1628. At the age of sixteen he was sent to Cambridge, where he made such excellent progress and was esteemed so highly that in 1651 he was appointed lecturer in Greek in Trinity College, in 1654 lecturer in mathematics, in 1658 junior dean, and in 1659 college steward. His attention was first drawn to natural history as a recreation in the intervals of his severer studies. At this time Oxford already possessed a botanic garden, but at Cambridge natural history had been entirely neglected. In 1660 he published his first botanical book—a catalogue of the wild plants of the neighbourhood of Cambridge, in which upwards of 600 kinds are enumerated. It met with a favourable reception amongst the younger collegians and led to his acquaintance with his principal friend and associate Francis Willoughby, the son of a gentleman of considerable fortune, whose estates were in Warwickshire. In 1661 they undertook together what was then considered a long journey of exploration, passing through Yorkshire as far north as Glasgow and Stirling, and back again to Cambridge through Westmoreland. Ray attended specially to plants and Willoughby to birds and fishes. A full account of what they saw is printed in Ray's 'Itineraries,' the portion devoted to Yorkshire filling nearly forty pages. Ray had been ordained as a clergyman, but when the Act of Uniformity came into operation in 1662

he refused to sign, and was in consequence expelled from his college, and this led to his devoting the remainder of his long life mainly to natural history. In 1663, Ray, Willoughby, and two others paid a long visit to the continent, not returning to England till 1666. In 1668 they made a second journey into the north of England. In 1670 he published his first Catalogue of English Plants, and in 1671 he made his third journey into Yorkshire, accompanied by Thomas Willisel, an uneducated man, who worked a good deal for them as a collector. In 1672 Willoughby died suddenly in the prime of life, leaving to Ray the task of educating his two young sons and working out his unfinished treatises on birds and fishes. These tasks Ray faithfully performed, and then turning to his plants again he published in 1690 the first edition of his 'Synopsis of British Plants,' a second in 1696, and the two first volumes of his great 'Historia Plantarum,' a history of all known plants, in 1686 and 1687, adding a third volume, which is mainly a compilation, several years later. His last work was his 'Methodus Emendata,' published in 1703, in which the foundations of the natural system of the present day are laid by the clear separation from one another of the Phanerogamia and Cryptogamia, and the separation of the former into Monocotyledons and Dicotyledons, with an accurate diagnosis of the two classes. A full account of what Ray knew about Yorkshire botany is drawn up by him in 1695, for Gibson's edition of Camden's 'Britannia.' This list contains the names of sixty-two rare plants of the county, with their localities.

Ray's principal friend and correspondent in Yorkshire was Dr. Martin Lister, after whom the genus *Listera* is named. Lister was a native of Buckinghamshire and was born in 1638. He was the nephew and namesake of Sir Martin Lister, who was president of the College of Physicians and physician in ordinary to Charles I. He was educated at Cambridge and in 1670 settled at York, where he became eminent in his profession, spending his leisure in the study of natural history and antiquities. In 1670

he visited Craven, and was the first to record *Polemonium cæruleum* from Malham Cove. He published several books, the best known of which is his 'Synopsis Conchyliorum,' which contains figures of all the shells that were then known. There is no letterpress except the names which accompany the plates, which were engraved for him by his two daughters, Anna and Susanna Lister. In 1684 he removed to London, and after attending the Earl of Portland on his embassy to Paris for William III, he became physician to Queen Anne, and died in 1711.

The best botanist of Ray's generation who lived in the north of England was Thomas Lawson. Thomas Lawson was a young clergyman just instituted to the living of Rampside, in Furness, when George Fox visited that region in 1652. Lawson lent him his pulpit for a day and Fox preached in it to such purpose that he convinced the priest and many of his congregation. Lawson gave up his living and removed to Great Strickland, a village a few miles south of Penrith, where he opened a school, at which he taught the young Lowthers and the sons of many other of the neighbouring gentry. He wrote several religious and controversial books, and in 1688, three years before his death, sent to Ray a long list of localities for rare plants in the north, which is printed in full at page 197 of the edition of Ray's letters, which was edited for the Ray Society in 1848, by Dr. Lankester. After him were named *Hieracium Lawsoni* and the genus *Lawsonia* in Lythraceæ. Ray's other Yorkshire correspondents were Thoresby, of Leeds, the antiquarian, and two Sheffield gentlemen, Mr. Samuel Fisher and Mr. Francis Jessop.

The best botanist in the country in the generation that followed the death of Ray was John Jacob Dillenius, who became the first professor of botany at Oxford. He was a native of Darmstadt, and was born about 1680. He studied at the University of Giessen, and wrote a capital account of the flora of that neighbourhood, in which 140 new mosses, and 90 new fungi are noticed. This attracted the notice of Dr. William Sherard, who had been consul at Smyrna, and accumulated there a con-

siderable fortune, and who was passionately fond of natural history. He invited Dillenius to come and settle in England, and in the year 1721 Dillenius accepted his invitation. Three years later Dillenius brought out a third edition of 'Ray's Synopsis,' but in deference to John Bull's susceptibilities it was issued without his name. In 1728 Sherard died, leaving a considerable sum of money to endow a botanical professorship at Oxford, to which Dillenius was at once appointed. William Sherard's brother James, who was a London apothecary, had a country residence at Eltham, with a fine garden attached to it. In 1732 Dillenius published his 'Hortus Elthamensis' in two large volumes, containing plates and descriptions of more than 400 interesting plants, all drawn from the living specimens and etched with his own hand. In 1736 he was visited at Oxford by Linnæus, who was about thirty years his junior. His great book was his 'Historia Muscorum,' published in 1741, a handsome quarto with 550 pages and 85 plates, in which an enormous number of mosses, lichens and algæ, were for the first time accurately figured and clearly characterised. In this book a number of familiar names, suchas *Hypnum*, *Bryum*, *Sphagnum*, and *Mnium* have their origin. He died in 1747, at the age of sixty.

Dillenius had a diligent Yorkshire correspondent in Dr. Richard Richardson, of Bierley, near Bradford, the discoverer in our county of *Trichomanes radicans*, the Irish filmy-fern, whose name appears often in the 'Synopsis' and 'Historia.' Dr. Richardson was a man of wealth and position, an M.D. and F.R.S., who kept up a correspondence with most of the leading naturalists of his day. His letters were preserved by his relatives and a selection from them was published in 1835 under the editorship of Dawson Turner, and it is from this that some of our best material for the personal history of the botanists of that generation is obtained. After him was named the genus *Richardsonia* in Rubiaceæ. He was born in 1663, and died in 1721.

The two other botanists of that epoch who were connected with the county whom I must mention are Thomas Knowlton and Samuel Brewer. Knowlton had been in the early part of his life gardener to Dr. Sherard. He came to Yorkshire and settled at Londesborough in the service of the Earl of Burlington. He was not a man of much education, but was a good practical botanist and gardener, and he has placed on record several localities for rare plants in the East Riding and in Craven. He was a frequent correspondent of Dr. Richardson's, and there is an amusing letter from him, written in the year 1736, grumbling about the innovations proposed by Linnæus :—'As for Linnæus' new method 'tis imposable for him or any other man whatsoever to go beyond a Ray, a Tournefort, etc., who have chose the flower and fruit, which are the princepily parts; as to a single part of the flower it is, in my opinion, altogether whimsicall and ridiculous, separated from the whole composure of them.' He lived to the age of 90, and died in 1782. After him is named *Knowltonia*, a Cape genus of Ranunculaceæ allied to Helleborus.

Samuel Brewer was a native of Wiltshire, in early life connected with the West of England cloth manufacture. He travelled widely through England and Wales in search of plants, sending his discoveries to Dillenius. He planned and nearly finished a book called the 'Botanists' Guide,' but it was never published. He lived for some time at Bangor, and was the first to gather many of the Welsh rarities. He lived in Yorkshire from 1727 for about ten years. He was not a good tempered nor a successful man, and his letters to Richardson are full of complaints. After him are named *Helianthemum Breweri* and the genus *Breweria* in Convolvulaceæ.

To Linnæus botany owed such an immense impulse, both as regards its organisation and popularisation, that one is apt to forget sometimes how many and what hard working writers and collectors preceded him. He was born in Sweden, in 1707, his father being a clergyman in such poor circumstances that when he sent his son to college he could only allow him eight pounds a year to cover all his expenses. At the age of twenty he was

sent to the University of Lund to study medicine, but after remaining there a year he removed to Upsala, where he was befriended by Celsius, the professor of divinity, and Rudbeck, the professor of botany, who possessed a good library of books of natural history. In 1732 he made a journey into Lapland, and wrote his 'Flora Lapponica.' In 1735, after taking his degree, he visited Holland, where he was befriended by Burmann, the professor of botany at Amsterdam, and Cliffort, a wealthy banker, who had a fine garden. Here he wrote his 'Fundamenta Botanica,' 'Genera Plantarum,' and 'Hortus Cliffortianus.' Returning to Sweden he married and went into practice as a physician, and became universally accepted as the leading naturalist of the day. His great works of this later period of his life are the 'Philosophia Botanica,' and 'Species Plantarum,' the first edition of which appeared in 1753, and the second in 1762. His industry and power of organisation were immense, and a mass of new material kept constantly pouring in for him to work upon. He invented the binomial plan of nomenclature, settled the genus question on its present footing, gave the names to the organs of a plant and their variations which are still universally used, set the example of characterising genera and species clearly and concisely, and classified all known plants according to the best of all the artificial systems that have ever been devised, which we know by the name of the Linnean or sexual plan of arrangement. He died in 1778, in the seventy-first year of his age.

A Flora which was much used in its day, which was substantially a new edition of Ray's 'Synopsis' translated into English, was published in 1744, by John Wilson, who taught botany, first at Kendal and afterwards at Newcastle-on-Tyne. In 1762, the same year as the second edition of the 'Species Plantarum' was published, William Hudson, who was also a native of Kendal, but who removed to London in early life and settled there as an apothecary, published a 'Flora Anglica,' in which the binomial names were used. It had a wide circula-

tion, and a second edition was issued in 1778. Hudson had a correspondent at Doncaster called Tofield, after whom he named the genus *Tofieldia.* My friend, Mr. Daydon Jackson, the secretary of the Linnæan Society, has in his library an interleaved copy of Wilson's 'Synopsis,' which is believed to have belonged to Tofield, in which a number of localities are entered in manuscript.

A 'Flora of England' was printed at York, in 1777, by Stephen Robson of Darlington, but it could not compete with Hudson's, and its circulation was very limited.

The first edition of Withering's 'Botanical Arrangement' was issued in 1786. A second and much improved edition came out in three volumes, from 1787 to 1793, and a third in 1796. Withering's Yorkshire correspondents were Stephen and Edward Robson of Darlington, the Rev. Wm. Wood of Leeds, who wrote the early articles on botany in the Cyclopædia of Rees, which after his death were continued by Sir J. E. Smith, and Caley, a protegè of Sir Joseph Banks, who travelled as a plant collector in New Holland.

In 1782 a lengthened botanical visit was paid to the North of England by William Curtis, who founded the 'Botanical Magazine.' He visited the neighbourhood of Settle and collected most of the rarities of that district. The paper which he wrote, giving an account of the journey, was published with his 'Flora Londinensis,' and was reprinted in the first volume of the new series of the 'Phytologist,' pp. 36, 84, and 108.

After the death of Linnæus in 1778 all his collections, both botanical and zoological, and his library, were purchased by Sir J. E. Smith, and removed to London. In 1788 they became the property of a Society in which nearly all the leading naturalists of the day took part, and which received a Charter of Incorporation from George III under the name of the 'Linnean Society,' which still remains in active working order at the present time. In the original list of Fellows there are five representatives of Yorkshire botany: R. A. Salisbury of Chapel Allerton, the Rev. W. Wood of Leeds, William Younge,

M.D., of Sheffield, who accompanied Sir J. E. Smith on one of his continental tours, Robert Teesdale of Ranelagh, and William Curtis. Knowlton was still alive, and joined soon afterwards; and amongst the original Associates was Edward Robson of Darlington, who in one of the early volumes gave a description of a new currant which he gathered near Richmond, under the name of *Ribes spicatum*. Sir Jas. E. Smith became the first President of the Society, and Goodenough, afterwards Bishop of Carlisle, the monographer of the British Carices, the first Treasurer. Sowerby's 'English Botany' was started in 1770, and Smith's 'Flora Britannica' was published in 1800.

In 1792 was drawn up the first extensive catalogue of Yorkshire plants, the fruit of the researches of Robert Teesdale, in the neighbourhood of Castle Howard. It was laid before the Linnean Society at their meeting on February 7th, 1792, and printed in the second volume of their 'Transactions,' (page 103). Teesdale had been in the employment of the Earl of Carlisle, but was now old and had gone to live in London. The prefatory remarks to his paper run as follows :—"During the time I resided at Castle Howard some of my leisure hours were employed in herborising. My business not admitting of long excursions, it enabled me to take the more pains in the collecting of the plants of my own neighbourhood. The woods about Castle Howard are extensive, and the bogs near Terrington produce many valuable acquisitions to the curious investigator. The downs called the Wolds are likewise productive of some good plants. I seldom extended my rides or walks upon these botanical excursions more than ten or fifteen miles from home, and upon summing up the plants I had observed and collected they amounted to 960. This, I presume, will be thought a great number to be found in so small a space of country by one collector, as the learned Dr. Martyn tells us in his 'Plantæ Cantabrigenses,' that with the indefatigable labours of Mr. Ray, Mr. Lyons, himself, and doubtless many other residents of the university, they have made their catalogue amount only to 829

species. Of the plants enumerated in this catalogue by Teesdale, 700 are Phanerogamia, 21 Filices, 100 Mosses, 32 Hepaticæ, 60 Lichens, 10 inland Algæ, and 33 Fungi, none of them microscopic. A second paper, which was published in the fifth volume of the 'Transactions,' contains a catalogue of all the plants known to Teesdale as growing in other parts of the county, with their localities. The two together contain upwards of 900 Phanerogamia and 500 Cryptogamia, so that we may fairly say that before the end of the eighteenth century the botany of the county had been worked out with much fulness, and look to Teesdale as the man who did the largest share of the botanical part of the work, which this society is founded to carry out. He died in 1804, and Robert Brown named after him the Cruciferous genus *Teesdalia*. A summarised abstract of the two catalogues is given by Turner and Dillwyn in their 'Botanists' Guide' of 1805, with a number of additions from other sources, especially from the Rev. Archdeacon Peirson of Coxwold, Mr. W. Brunton of Ripon, the Rev. Jas. Dalton of Copgrove, and the Rev. J. Harriman of Eglestone.

There were two other men of this generation who were natives of Yorkshire who left their mark upon botany, though not in our own special field of local research. These were Richard Anthony Salisbury and John Fothergill. Salisbury was a man of considerable fortune, the son of a Leeds clothier, who had a fine garden at Chapel Allerton, of the contents of which he published a description in 1796. Soon after this he removed to London, where he remained for the rest of his life. He wrote a book called 'Paradisus Londinensis,' which contains quarto plates, with descriptions, of a large number of curious garden plants. To the 'Transactions' of the Royal Horticultural Society he contributed a paper in which he suggested, though without characterising them, many new monocotyledonous genera, which have since been adopted. At his death, in 1827, he left in an unfinished state a book on the genera of the petaloid monocotyledonous orders, which was printed many years after his death by Dr. J. E. Gray. He was a man of great

originality and vivacity, but his general ideas on systematic botany would, if carried out, have entirely upset our received arrangements, and he quarrelled with and criticised spitefully the cotemporary leaders of the science.

Dr. John Fothergill was a man of very different character. He was a staunch member of the society of Friends, and took a leading part in managing its affairs and founding the large School at Ackworth, of which the centenary has lately been held. He was the son of a yeoman-farmer in Wensleydale. Adopting medicine as his profession he studied at Edinburgh and took his degree, and after travelling on the continent, settled in London. He gradually made his way to the foremost rank in his profession, and was able to spend each year in philanthropy and science a large sum of money. He had a beautiful garden in Essex, a catalogue of which was published, and he was the first to introduce into England a large number of plants and shubs, especially from the United States. On the occasion of the Ackworth anniversary a full and interesting account of his biography was drawn up and circulated by my friend Mr. J. H. Tuke.

My remarks have extended so far that I must deal very briefly with the early cryptogamists of the county. A few species were noted by Ray, and several others were sent to Dillenius by Richardson and Brewer; then came Sir Thomas Frankland, who collected and made drawings of algæ at Scarborough. In naming after him, in 1809, a new genus of Proteaceæ, Robert Brown wrote as follows: 'This genus is named in honour of Sir Thos. Frankland, Baronet, to whom English botany is much indebted, and whose valuable observations and excellent figures of submarine plants it is hoped he may be induced to communicate to the public.' Sir Thos. Frankland was the fifth baronet; he was born in 1750 and died in 1831. He was High Sheriff of the county and for many years represented Thirsk in parliament, and our President-elect, Lord Walsingham, is his great grandson.

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THE

TRANSACTIONS

OF THE

YORKSHIRE NATURALISTS' UNION.

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CINCLUS AQUATICUS *Bechstein.*

Dipper.

A local resident.

'Rarely met with in the East Riding, frequently seen on the mountain streams of the North and West Ridings.'—*Thomas Allis*, 1844.*

The Dipper is a common resident on the mountain becks and rivers which abound in or traverse the Fell district of north-western Yorkshire; it also occurs, but less numerously, on the streams of the south-western moorlands, and is fairly common in suitable haunts among the hills of Cleveland. In these extensive habitats the three-hundred feet contour line may be taken as defining the lower limit of the bird's distribution in any considerable abundance, while below this elevation it is sporadic down to as low as one hundred feet. It is a strictly sedentary species, but when frosts of unusual severity and long duration render its subalpine home untenable, owing to the ice-bound streams no longer affording food, the Dipper descends to the lower reaches, and even then seldom indeed moves further than necessary, though it has once or twice been known to visit the polluted waters of the manufacturing districts.

It is not known with certainty to have occurred in the East Riding, unless indeed the bird shot by the Rev. F. O. Morris at Nunburnholme, on the 10th of January, 1856, belonged to this form, which is questionable, since it was not preserved. This absence from a district which includes the Yorkshire Wolds, attaining to an elevation of 805 feet, is to be accounted for by the deficiency of permanent streams, the only rivulets to which the undulating chalk hills give rise being the intermittent ones termed 'gypseys.'

* As Mr. Allis' 'Report on the Birds of Yorkshire,' prepared for the York Meeting of the British Association in 1844, has never been published, it is intended to quote verbatim all that he has to tell concerning them, commencing each species with his account of it. I beg to acknowledge my indebtedness to Mr. Wm. Pumphrey—the late Mr. Allis' son-in-law—for his kindness in entrusting me with the original manuscript of this valuable paper.

A curious fact in the nidification of this species is related by Mr. Henry Smurthwaite, of Richmond (Zool., 1859, p. 656). The nest was placed at the extreme end of an old sand martin's hole, which extended two feet in a bank overhanging a stream. The old bird was captured on the nest, which contained five fresh eggs. Subsequently it was dug out and was found to resemble much in shape that of a blackbird; but, as usual, was composed of moss thickly lined with oak leaves, the dome, however, being entirely wanting. Mr. Smurthwaite also describes (Morris' Nat., 1855, p. 268-9) another nest which, strange to say, was placed under a small railway bridge. Here five nests were constructed by the same pair of birds in the spring of 1855, from which no less than 23 eggs had been taken, and at the date of writing, May 15th, the old bird was sitting on two more eggs.

A nest of this species at Richmond contained three eggs as early as March 15th, and my earliest record for young birds is the 6th of April, on Hambledon.

Historically, perhaps, the oldest Yorkshire Water Ouzel is the one described by John Ray, which was shot on the River Rivelin, near Sheffield (Willoughby's Ornithology, 1678, p. 149).

CINCLUS MELANOGASTER *C. L. Brehm.*

Black-bellied Dipper.

A casual visitant from Northern Europe.

It is not within our province to debate here the claims of this bird to specific rank. This much however must be said for it, that it is a well-marked climatic race—one of those birds to which the writer would wish to see European ornithologists apply the trinomial system of nomenclature so usefully employed by American ornithologists for similar birds in North America, and by whom this form would be styled *Cinclus aquaticus melanogaster*.

The Black-bellied Dipper is a common Scandinavian and North Russian bird, and seems occasionally to wander across the waters of the North Sea to eastern England. In our own county it has hitherto only, and perhaps, obviously, been obtained in the vicinity of the coast, where in the East Riding it has been obtained on four occasions; twice during the period of the autumn migration. Three of these birds have passed into the hands of ornithologists and, it is worthy of note, have been examined by experts and pronounced to be true *melanogasteres*. The following are the particulars of the occurrences :—

One shot on a drain at Welwick, on the 24th of October 1874, is now in the writer's collection.

In the Zoologist (1876, p. 4871) Mr. F. Boyes records as a Black-bellied Dipper one shot on the river Hull at Beverley, on the 29th of October 1875, by a man named Priestman.

The Rev. Julian G. Tuck (Field, Jan. 1876, p. 22) mentions one shot at Flotmanby near Filey, on the 8th of December, 1875.

In the collection of Mr. J. H. Gurney, Jun., is a specimen which was shot near Bridlington, and was purchased by him of the late Mr. Jones, taxidermist, of Bridlington Quay.

Another East Riding Dipper was shot by the Rev. F. O. Morris in the stream at Nunburnholme on the 10th of January 1856, but as this specimen was not preserved further information regarding it cannot now be obtained.

TURDUS VARIUS *Pallas.*

White's Thrush.

An accidental visitant from Eastern Asia.

The peregrinations by which this species reaches Britain are very remarkable. A summer visitant to, and breeding in, Central and Eastern Siberia, and Northern China, White's Thrush winters in South-Western China, Southern Japan, and

the Phillipine Islands ; and since we have chiefly authentic evidence of its occurrence in Yorkshire in the fall and winter, we may conclude that this species has journeyed very far west during the autumn passage, crossing half Asia and the whole of Europe, instead of undertaking the normal and much shorter south-east route.

This bird has been recorded to have occurred on five occasions in Yorkshire. One of these is considered to be open to doubt by Mr. Harting in his Handbook of British Birds, namely that mentioned by the Rev. J. C. Atkinson as observed in the spring of 1870, on his lawn at Danby-in-Cleveland, which he examined carefully on two occasions with a binocular glass, and mentioned in the Zoologist (May, 1870, p. 2142) as this species. We may, however, agree with Professor Newton in his opinion (Yarrell's British Birds, i. 252) that 'this well-known observer is hardly likely to have been mistaken.'

On the 14th of October, 1864, Mr. Alfred Beaumont, the president, exhibited to the Huddersfield Naturalists' Society, a specimen which he said had been shot at Almondbury Bank. I have endeavoured to obtain further and more detailed information about this bird, but none appears to be attainable.

In the latter part of November, 1878, Mr. Martin Simpson, curator of the Whitby Museum, received a bird of this species which had been killed by coming in contact with the telegraph wires near that town (Zool., 1880, p. 68). The specimen is now in the Whitby Museum, where the writer has seen it.

During the first week in November, 1881, a White's Thrush was shot at Rimswell, near Withernsea, in Holderness, by Mr. W. J. Tuton, who mistook it for a woodcock as it rose from a low, thick hedge close to him. This specimen is now in the collection of Mr. R. T. Burnham, of Rimswell, to whom I am indebted for these particulars, and for several opportunities of examining his beautiful specimen.

Finally one was obtained at Waplington Manor, near Pocklington, early in January, 1882, and recorded in the Field (1882, p. 201), and later in the Zoologist (1882, p. 74) by Mr. Jas. Backhouse, Junr.

TURDUS VISCIVORUS *L.*

Missel-Thrush.

A common resident.

'Common over the county.'—*Thomas Allis*, 1844.

In addition to being a very generally distributed and abundant resident, flocks of immigrant Missel-Thrushes arrive on our coast in the autumn from northern Europe, where the bird is to some extent a summer visitant; thus at Redcar on the 4th of October, 1884, at 8 a.m., flocks were 'coming in,' the wind being N.W. and fresh (Sixth Migration Report, p. 41). Some of these immigrants, perhaps, remain with us during the winter months, or they may, as Mr. Cordeaux states (Birds of Humber District, p. 19), leave us for a more southerly clime on the first really severe weather. Our indigenous birds however seem to be of a strictly resident turn, frequenting as a rule the vicinity of their chosen haunts, except in very severe seasons when they are compelled to roam southwards. In the exceptional winters of 1878-9 and 1879-80 their numbers were very materially reduced, and for the following year or two their diminished ranks were the theme of many notes. Now however they are quite as numerous as ever.

This bird nests in a variety of situations, being equally at home and well-known in the more secluded gardens around our great towns, in orchards and woodlands, in the alders bordering our upland streams, in the fir plantations which so frequently fringe the moors, while in some instances nests have been found on the very moorlands occupying a place in a stone-fence. It is

certainly double-brooded, and Mr. F. Boyes has noted that, in an orchard at Beverley, the same nest has been used for both broods. In 1871 he found the old bird sitting on four eggs in the last week in March, which hatched early in April; and on the 19th of May the nest again contained four more young birds. The earliest nest known to the writer contained eggs in the first week in March. The gizzards of young birds examined by Mr. Geo. Roberts contained caterpillars, flies, elytra of beetles, and numerous 'minute, round, white bodies, resembling the eggs of insects.' After the breeding season the birds pack, and on the occasion of the Hawes Meeting of the Union on June 28, 1884, I observed a large party swooping down the fell side uttering their characteristic 'churring' note. These gatherings have in not a few instances, no doubt, been reported as early Fieldfares.

A variety shot near Patrington some few years ago, formerly in the possession of Mr. Philip W. Lawton, and now in the collection of Mr. Marshall, of Taunton, has the ground color of the feathers white, while the spots and other markings are of the usual tint.

The earliest mention of this as a Yorkshire bird, so far as the writer is aware, is contained in the appendix to the Rev. John Graves' 'History of Cleveland,' dated 1808.

This bird is very generally known as the 'Storm-cock.' In Cleveland, from its early song, it is dubbed 'Jeremy Joy' (January Joy); and in Craven it is called the Churcock.

TURDUS MUSICUS *L.*

Song Thrush.

A resident, common in summer.

'Generally diffused.'—*Thomas Allis*, 1844.

The Thrush is a resident species, abundant in most districts in the summer months, quite the reverse during the winter,

and though its numbers were markedly reduced by the arctic winters of 1878-9 and 1879-80, it is now quite as numerous as before. In the wilder portions of the county it becomes scarcer and while it is almost unknown on the moorlands, Mr. Lucas (Zool. 1879, p. 410) mentions its occurrence in Nidderdale up to at least 1200 feet. The Yorkshire Thrushes are partially migratory: on the approach of winter the great majority move south, while the few that stay with us during the drear months are either immigrants from more northern localities or are old birds; these enliven us by their cheery song during the finer winter days and until the main body returns in the earliest days of spring.

Nidification commences early, for it is not an uncommon event to find young birds some days old early in April, and nests and eggs have been found in the county in February, while during the abnormally mild winter of 1843 a nest and three eggs were found near Campsall in South Yorkshire on Christmas Day (Schroeder's Annals of Yorkshire, 1851, p. 350). The latest date known to me for eggs is the 27th of July. In the writer's collection of eggs is one marked with large red spots, or rather blotches, obtained by him from a nest at Arthington in 1878, the other eggs of the clutch being similarly but not so boldly marked. The Throstle, as it is locally called, is double-brooded, and sometimes rears both broods in the same nest. A curious nesting site is described in the Naturalist (1876, p. 155), an old tea-kettle hung on a branch in a plantation near Huddersfield having been selected.

This bird being a summer visitant to Scandinavia, migrants from the north, as we might naturally expect, arrive on our shores chiefly in October and November, along with Fieldfares and Redwings. Two were captured on a vessel 14 miles off Whitby on the 7th of October 1833 (Edward Blyth). In the spring these hyperborean Thrushes again visit us on their northward passage; and at Flamborough Lighthouse on the early morning of the 12th of March 1877, the weather being hazy,

several struck the lantern; again on the 27th of April 1883 one was killed, and on the 7th of May of the same season four more were immolated.

Mr. Boyes of Beverley describes in the Zoologist (1879, p. 256) a variety obtained in Holderness in which the markings are normal but the general colour a 'rusty-buff or yellowish sandy hue throughout.' White specimens have been obtained near York, and 'particoloured' black and white ones near Pontefract in 1846.

Probably the earliest mention of the Thrush as a Yorkshire bird, with which the writer is acquainted, is made by Marmaduke Tunstall, F.R.S., a Yorkshireman and an ornithologist of repute, who resided at Wycliffe in the North Riding, in the last century (1743—1790), who mentions this species as 'singing in the north in December.'*

TURDUS ILIACUS *L.*

The Redwing.

A common winter visitant.

'Frequent in winter.'—*Thomas Allis*, 1844.

Though there are not a few records of parties of Redwings arriving in the county during the latter days of September, the middle of the following month must be regarded as the usual date for its advent, while many even appear later in October and in November along with the Fieldfares. After their arrival they become generally distributed and common over the county throughout the winter, save in very severe seasons, when they

* Tunstall's Notes, to which we shall often have occasion to refer, consisted of remarks on Dr. Latham's 'Synopsis of Birds,' apparently addressed to Latham soon after the publication of his earlier volume about the year 1783, with additions in 1784. The original MS. came into the hands of Geo. Townshend Fox, who reproduced it in his 'Synopsis of the Newcastle Museum,' published in 1823.

either move further south or perish in great numbers—the species being one of the first to feel the pangs of want—and become conspicuous by their absence. Their sojourn extends until April, and the 27th of that month is the writer's latest date for their departure.

During the excessively severe weather in December, 1878, thousands of these birds succumbed or were so pinched by hunger that they actually entered the busy thoroughfares of Leeds in search of food. At Flamborough Mr. M. Bailey noticed them daily resorting to the shore at low-water to search for food amongst the seaweed and refuse fish, and when the tide rose they sought shelter at the base of the cliffs and scores perished.

The Redwing is reported to have nested in the county on several occasions, and although it is to be regretted that the evidence is not perhaps conclusive, it is yet of such a nature as to be worthy of recapitulation.

Mr. Hogg, in his Catalogue of Birds of North-East Cleveland and South-East Durham (Zool., 1845, iii. 1086) says, 'Mr. J. W. Ord has informed me that a Redwing's nest, with four eggs, was found at Kildale, 1840. John Bell, Esq., M.P., has two of those eggs; and the other two are at Kildale Hall, in the possession of E. H. Turton, Esq.'

Under the heading of 'Nesting of the Redwing in North Yorkshire,' Major W. Feilden communicated the following to the Zoologist for 1873 (pp. 3511-12); 'The following note to an article on Natural History by the Rev. J. C. Atkinson appears in the People's Magazine for December 1872, p. 379: —'I obtained four eggs about ten years ago from a nest in Commondale (North Yorkshire) about which, from the circumstances connected with bird, nest and eggs, there could be no reasonable ground of doubt as to their origin. Only I did not see the bird myself. I received the eggs and the account from a person whose father had been a gamekeeper, and whose own

habits have led him to act often as an amateur keeper, and had made him very familiar with various birds and animals. Hence the eggs, when shown to some metropolitan egg-authorities, were pronounced not Redwing's, but Ring Ouzel's eggs. However, during the past spring a Redwing's nest and eggs, together with the parent bird herself, have been obtained in Glaisdale, another district (originally of the same parish to which the Commondale mentioned above belongs); the person meeting with them being a very competent ornithologist and experienced egg-collector. The fact that the Redwing does occasionally breed in North Yorkshire, and I think not so very unfrequently, is an interesting one, and therefore not unworthy of record here.'

Finally, Mr. James Backhouse, Junr., in the Zoologist (1879, pp. 460-1) speaks on its supposed nesting near York. 'Whilst shooting on August 27th I killed a bird which, in the dim evening light, looked like a Thrush, but on examining it next day I found it was a young Redwing (moulting). The body was a good deal shattered, but the head was left untouched and showed the whitish line above the eye very well. The colour under the wings was also very deep. Does not this clearly prove that a pair of Redwings have bred in the county . . . ?'

A buff variety with light grey markings and the red patch of a paler shade was shot by Mr. Alwin S. Bell, near Scarborough, about 1855 (Zool., 1870, p. 2343).

The earliest mention of this species as a Yorkshire bird appears to be in 1808, in the appendix to Graves' History of Cleveland.

In Cleveland it is locally known as 'Swinepipe' from its note.

TURDUS PILARIS *L.*

Fieldfare.

A common winter visitant.

W. Eddison says : 'I am well assured that both this winter visitant and *Iliacus* very frequently stay the year round in several places near Huddersfield, and that he has many times seen them in the summer months ; mention is also made of its breeding in Yorkshire by W. Yarrell. It bred last year at Lepton, near Huddersfield.'—*Thomas Allis*, 1844.

It is hardly necessary to remark that there is not a particle of evidence as to the Fieldfare's ever having nested in the county ; indeed all we know on the subject is contained in Mr. Allis's statements quoted above ; so that what Tunstall said of this species one hundred years ago is true to-day, namely : 'I have known them in the north as far as the latter end of March, yet never heard them sing, or that they built there.'

As an abundant and widely distributed winter visitant this species arrives in flocks usually during the latter half of October and in November and remains until April. In some seasons the autumn immigration commences as early as the end of September, as in 1875 for instance, while on the 24th of Jan. 1880, numbers arrived on the Holderness coast ; nor was this late movement confined to the east coast of Britain, for Herr Gätke informed Mr. Cordeaux that from the 21st to the 24th of that month quantities crossed Heligoland from the east. These birds were in all probability driven from northern Europe by an outburst of severe cold in what had hitherto been there a mild season. Like its congeners it suffers during severe seasons, and during the winter of 1879-80 was very scarce after the arctic weather of the preceding year.

Prior to leaving for its breeding-zone, the Fieldfares in some districts assemble in great numbers, and the writer knows a small plantation bordering the stream traversing a secluded dell in Washburndale where in mid-April they may be seen in

hundreds and heard incessantly chattering for several days before departure. During this conclave they are very restless, taking short flights *en masse* but returning after a short absence. The latest date for its occurrence in spring known to me is June 1st, 1869, when Mr. Lucas observed it at Brimham, in Nidderdale. There are many records during May, some up to the middle of that month.

Historically as a Yorkshire bird the Fieldfare claims an ancestry of great antiquity, for we find in the ordinances as to the price of food in the city of York in the year 1393—the 16th year of the reign of King Richard the Second—that the price for twelve Fieldfares be twopence.

There are several records of pied specimens having been seen or captured in the county, and a light buff variety at Wakefield was noted by the late Mr. Wm. Talbot in 1873.

A general vernacular name for this species is Fellfer or Felfer; while Bluetail is a local name in vogue in the Doncaster and Craven districts, and Bluerump about Doncaster.

TURDUS MERULA.

Blackbird.

A resident, common.

'Equally common with the above [the Song Thrush]. A male blackbird paired this season with a female thrush in my own aviary [York]. The thrush built the nest and laid one egg when things were put a stop to by a wood pigeon, which had formerly built its nest in precisely the same place.'—*Thomas Allis*, 1844.

The Blackbird is a common and generally distributed resident, occurring at a considerable elevation in the moorland and fell districts. In addition to this it is a winter visitant, or an autumn bird of passage, immigrant Blackbirds arriving on

our coast at dates varying from late September to the end of November, but are usually most abundant during the last fortnight of October, when, along with the Fieldfares and Redwings, they frequently perish during fog at the lanterns of our sea marks, for their migrations are chiefly undertaken during the hours of darkness. The great majority of these migratory birds are young males of the year with dark-coloured bills, but on the 24th of January, 1880, there arrived, on the Holderness coast, many fine old cocks, along with great numbers of Fieldfares, probably from Northern Europe. After their arrival these birds appear to be much more fatigued by their passage than their congeners, and the writer has, on several occasions, had to avoid treading them under foot. On their return passage in the spring they are not often reported, but during the early morning of the 12th of March, 1877, a few were killed against the Flamborough Beacon, along with several Fieldfares. Other observations from the East Coast, communicated to the British Association Migration Committee, indicate that they usually leave us during February and March.

The records relating to pied Blackbirds are very numerous. Marmaduke Tunstall, of Wycliffe, in the North Riding, writing one hundred years ago, remarks, 'Have had many pied Blackbirds, which seemed healthy, stout birds, and sung lavishly; had once one quite white, but always appeared sickly and cramped, and lived not long: have it now set up.' A perfectly white specimen was seen at large by the writer at Harewood, near Leeds, in November. 1885; while one observed by him on Strensall Common, near York, in April, 1880, had a creamy-white head, which was sharply defined from the remaining black plumage.

An interesting note on the nidification of this bird appears in Neville Wood's 'Naturalist' (1837, ii. 166), where a pair are described as having their nest beneath the leaves of a large brocoli in the garden at Wentworth Castle, near Barnsley. This nest was completely buried by the snow which fell during

the first week in April, 1837, but the parent birds formed a tunnel beneath the snow over two feet in length, and through this gained access to their young. In the last week of December, in the unusually mild season of 1854, a nest with four eggs was found at Sneaton Thorp, near Whitby.

Local Names: Ouzell or Ouizle (West Riding); Black Ouzle (Craven); Black Uzzle (Cleveland); Blackie (general among school-boys).

TURUDS TORQUATUS *L.*

Ring Ouzel.

A summer visitant, locally distributed; a transient visitant in the autumn.

'Common on high moorlands; according to Dr. Farrar they are sometimes met with in the more frequented lowlands. R. Leyland on one occasion saw a flock of more than twenty feeding on the berries of a mountain ash in a garden near Halifax in the month of September. Arthur Strickland has once or twice met with considerable flights of this bird when shooting in turnips in the autumn, probably collecting for emigration and apparently consisting for the most part of birds of imperfect plumage, probably birds of the year.'—*Thomas Allis*, 1844.

In addition to being a summer visitant to the broad belt of moorland and the heather-clad fells which range along the entire west of the county and to the Cleveland moors, the Ring Ouzel occurs as a transient visitor in the autumn from northern Europe when on its way to more southern winter quarters, and doubtless again in the spring on its return journey, but its movements at the latter season are much mixed with those of our immigrant summer visitants.

As a summer resident in the wide area occupied by its habitat, it is as numerous at the present time as it was two centuries ago, when the erudite Martin Lister of York wrote to the celebrated John Ray under date of July 2nd, 1676, as follows: 'As to that question of a Heath Throstle, I find that

the Ring Ouzel is so called with us in Craven, where there is everywhere in the moors plenty of them.' It is perhaps most abundant on the rolling heatherlands of the south-west, where the late Mr. Wm. Talbot informed me he had found no less than thirteen nests during a walk from Hebden Bridge to Todmorden, a distance of but a little over two miles.

This bird usually arrives at its breeding haunts during the first week in April, sometimes in flocks; the cock is then very noisy and is heard pouring forth vehemently his stunted song from every prominent crag or other coign of vantage. Towards the end of the month the nest may be found either on the ground on a flat expanse or sloping bank of heather, or else in the heather fringing the brink of a dell or moorland beck, or concealed in a solitary tuft on a rocky hill side, and the writer has also found it placed between the stem of a whin bush and the face of the crag from which it sprang. He has found a nest containing five eggs, but four seems to be the usual number. A Ring Ouzel is recorded by Mr. Heppenstall (Zool. 1843, p. 144) to have nested on the bank of a peat drain on Thorne Waste, a low-lying tract of heath on the Lincolnshire border of the county, and only a few feet above sea level. It is also said to have nested near Beverley (Zool. 1865, p. 592), but the occurrence in this instance is open to the gravest doubt. These summer visitants quit the moors in September, even early in that month visiting the lowlands and the coast, and as a rule leave the country by the end of the month.

In the late autumn, usually during the closing days of October, a considerable number of these birds arrive on the coast and linger in its immediate vicinity* for some days (in 1882 a couple of weeks) frequent tall old hedgerows of whitethorn, where they feast upon the haws, the gizzards of those examined containing no other food. The numerous

* The writer saw a pair feeding on haws at Arthington in Wharfedale on the 2nd of November, 1884.

specimens we have then obtained and examined have been in winter plumage, the males, which largely predominate, having the gorget dull white, the feathers of the throat, breast, and abdomen edged with greyish white.

On several occasions single birds have been obtained in the county in mid-winter, namely, at Holmfirth on the 25th of December 1855 (Morris's Nat., 1856, iv. 93); at Oxenhope near Keighley on the 2nd of February 1856 (Morris's Nat., 1856, vi. 92); at Leeds in December 1881; and Mr. Smurthwaite of Richmond states (Morris's Nat., 1854, iv. 81) that it is sometimes obtained in December and January. Regarding these birds it would seem most probable that they are autumn visitants attempting to winter with us, rather than laggard summer visitants or their young.

Local Names: Heath Throstle (Craven, 1676); Crag Ouzel (Craven); Moor Blackbird (Sheffield and Craven); Ring Uzzle (Cleveland).

MONTICOLA SAXATILIS (*L.*).

Rock Thrush.

An accidental visitant from Central or Southern Europe.

This species is a summer visitant to the mountainous districts of central and southern Europe, and winters in Arabia and Africa. As a straggler it has occurred at Heligoland and perhaps on three occasions in Britain, once in our county.

Regarding its occurrence near Whitby, Mr. Thomas Bedlington, of Middlesbrough, writes as follows in Morris's Naturalist for 1856, p. 21: 'In June, 1852, I saw a bird in the neighbourhood of Robin Hood's Bay that I was not acquainted with. I followed it for about two miles, and often got within a dozen yards of it, by creeping behind hedges. In its movements it was very like a Thrush, but it was rather smaller

4. *Humber*—Howden! and pond near Howden station! Carlton pond nr. Snaith, several, June 17th, 1882, W.D.R.! canal at Burton Hall! Selby Cut! ditch alongside Selby Cut! ditch, Ermine Street, Castleford, March 22nd, 1868! stream, north of Castleford, March 22nd, 1868! Fairburn, April, 1865, W.H.B.; Ferrybridge, April 2nd, 1877, H.C.! pond near Brotherton! Newsholme! Fryston Park, July 1st, 1871, G. Roberts; ditch near the railway, Milford!

5. *Hatfield and Thorne*—Ditch alongside Black Bank Drain, plentiful, April 14th, 1883, W.D.R.! Ackholme, plentiful, May 14th, 1883, W.D.R.! Gravel Drain near Auckley Common, plentiful, May 14th, 1883, W.D.R.! R. Torne, common, May 14th, 1883, W.D.R.! Ditches near Blaxton Grange, plentiful, May 14th, 1883, W.D.R.!

7. *Went Vale*—Pond near Smeaton Crags! Ackworth, common in stagnant pools, C.A., 1854; Ackworth, common throughout, C.A., 1874; Ackworth, H. Richardson! 'Recorded as being found here, but it seems likely that *P. spirorbis* has been mistaken for it' (Report of Boys' Association, Ackworth School, 1883, p. 5); Askern, July 21st, 1881, H.S.! common in ditches at Cowick Park near Snaith, June 17th, 1882, W.D.R.!

8. *Dearne*—Canal at Royston, March 29th, 1868!

10. *Colne*—Huddersfield, canal and ditches, rare, G. H. Parke, in Hobkirk's 'Huddersfield,' p. 224, 1868; common in Huddersfield canal, J.Wh.

11. *Upper Calder*—Luddenden Valley, J.C., in Nat., 1875, i, 15.

12. *Lower Calder*—Wakefield, very common throughout the district, with *P. spirorbis*, J.H., 1874; abundant on dead 'flags' in canal near Carlton, March 20th, 1864! canal at Stanley! and at Notton! Walton, J.W.

13. *Airedale*—Leeds and Liverpool canal at New Wortley, 1871, H.S.; near Armley! and at Calverley, H.S.; plentiful in pond at Black Hills, Leeds, April, and June 28th, 1883! stream, Allerton Bywater, March, 1881! Leventhorpe pastures, May 16th, 1864, J.B.; canal, Fleet Mills near Swillington! Lofthouse district, common, G. Roberts, 1882.

15. *Wharfedale*—Ditch between Weeton and Otley!

20. *Lower Tees*—General in the Lower Tees district, J. W. Watson, 1881; several waters near Roseberry in Cleveland, 1879, C.A.; pond near Stainton in Cleveland, Baker Hudson, 1885; Middlesbrough district, Baker Hudson, 1883; Southbank near Middlesbrough, H. Pollard.

22. *Upper Derwent*—Scarborough, W.B.; Scalby Bridge, W.D.R.!

23, *Chalk Wolds*—Brantingham, J.D.B.

24. *Holderness*—Hull district, not so common as *P. spirorbis*, J.D.B.; Spring Dyke, Hull, J.D.B.; ditch, strongly impregnated with iron, at Figham, Beverley, not common, J.D.B.; Figham, May 29th, 1882! rejectamenta of Beverley Beck, J.D.B.; pond near coast, Skipsea, April, 1879! Hornsea Mere, June 6th, 1881, W.D.R.! plentiful in the river Hull at Driffield, 1882, L. B. Ross!

Dr. Jeffreys says when speaking of *Planorbis vortex*, 'This species was first described and figured by Lister.' We are unable to agree with this determination, and consider Lister's description—Cochlea exigua subfusca, alterâ parte planior, sine limbo, quinq; spirarum—as more applicable to *Planorbis spirorbis*.

The *Planorbis bavayi* from Guadeloupe, described and figured by M. Crosse in the 'Journal de Conchyliologie' for 1875, vol. xxiii., p. 329, and vol. xxiv., p. 388, pl. xi., fig. 3, seems to be very closely allied to, if not absolutely identical with our *Planorbis vortex*.

Var. compressa Mich.

This form was originally indicated by Draparnaud as var. *α* of *Planorbis vortex*; subsequently M. Michaud bestowed upon it the name of *Planorbis compressus* and elevated it to specific rank. There can be no doubt that it is merely a variety of *Planorbis vortex*.

12. *Lower Calder*—Dirtcar, J. Hebden.

Planorbis carinatus Müll.

Locally common in the lowlands.

Dr. Jeffreys credits this species with only a very partial distribution in this country, but our investigations on this subject show that it ranges over nearly the whole of England, south of Northumberland.

In Yorkshire it is found most numerously in the southern districts, and hardly occurs in the northern half of the county, the only known localities being the neighbourhood of Scarborough, and three widely separated places in Wensleydale.

According to Lehmann there is no difference in the structure of *P. carinatus* and *P. complanatus*, and that author therefore considers *carinatus* as only a variety of the more abundant *P. complanatus*.

The Rev. E. P. Knubley, in May 1885, found this species in a sub-fossil state associated with *P. complanatus*, *P. corneus*, &c., on the banks of the River Tutt, two miles south of Boroughbridge, in a deposit two feet below the surface, and about the same time, found it also sub-fossil on the site of an old pond at Staveley. *P. carinatus* is also found with other species thrown up by the moles, or turned up by the plough on the arable land at Askern.

3. ***Vale of York***—Common and well distributed about York, Askham, Hobmoor, the Foss, &c., being its localities, R.M.C., 1881 ; one specimen in a ditch by Foss, above Yearsley Bridge, 1858, W. Whitwell ; Strensall Common, local and not common, W. Hewett, 1884 ; Askham Bog, May, 1877 ! pond, Dringhouses, July, 1882, G. Webster ! ditch, Tadcaster ! common in ditches NW. of Church Fenton, Aug. 1881, W.D.R. ! Boston Spa district, J. Emmet, 1880 ; Malton, May 17th, 1880, J.D.B. ; pond, Riccal, June, 1879 !

4. ***Humber***—Goole, R.D.M., 1876 ; Howden ! Selby Cut, June, 1879 ! canal, Burton Hall ! Brotherton ! Ferrybridge, J. W. Wood ! pond near Fairburn, June 1885, W. Webster ; wide ditch at Fairburn, July, 1885 ; Knottingley, J.W., 1885 ; pond at Castleford, March, 1877 ! pond in the pastures near the new iron railway bridge, Castleford, June 15, 1885, G. Roberts.

5. ***Hatfield and Thorne***—Plentiful in ditch alongside Black Bank Drain, April 14th, 1883, W.D.R. ! R. Torne, several, May 14th, 1883, W.D.R. ! common in Gravel Drain, Auckley, May 14th, 1883 !

6. ***Trent***—Doncaster, J.W., 1885 ; Conisborough district, June 2nd, 1873, J.W.

7. ***Went Vale***—Ackworth, a few specimens, C.A., 1854 ; mill pond, Ackworth, not common, C.A., 1874 ; Ackworth, J.W., 1885 ; canal, Wintersett, W. E. Brown, 1880 ; Askern Pool, E. Lankester, 1842 ; Askern, July 21st, 1881, H. Shaw ! Nostell Dam, J.W., 1885 ;

pond near Smeaton Crags! Smeaton, 1871, G. Roberts; pond in a field about 300 yards above Wentbridge, H. Richardson, 1883; Norton, one or two specimens, April 22, 1878!

8. *Dearne*—Barnsley canal, below Barugh Lock, June 19th, 1877, A. P. Taylor! Bretton, J.W., 1885; numbers of dead shells obtained from the mud cleaned out of the fish pond, Cusworth Park near Doncaster, 1883, T. H. Easterfield!

10. *Colne*—Huddersfield canal, rare, G. H. Parke in Hobkirk's 'Huddersfield,' 1868; common in a dam at Deighton, J.Wh.

11. *Upper Calder*—Luddenden Valley, July 10, 1875, J.C.; Halifax, J.W.

12. *Lower Calder*—Common in the Wakefield and Barnsley canal, J.H., 1874; Cold Hiendley, Chevet, and New Millerdam, J.W., 1885; pond near Sandal Castle! Bottom Boat near Wakefield, H.C., 1877!

13. *Airedale*—Common in pond, Baildon Green, July, 1882! and Aug. 19, 1883, W.D.R.! canal, Micklethwaite, March 12th, 1882! Bingley, J.W., 1885; canal at Saltaire, J.W., 1885; ditch, Waterloo, near Leeds, April 3rd, 1866! Leventhorpe, 1883, G. Roberts; very numerous in a small brook behind Wilkinson's Mill, Hunslet, May 7, 1861! the locality built over soon after, Goodman Street now stands on the site; reservoir, Cross Stamford Street, Leeds, H. Pollard, 1876! pond, Black Hills, Leeds, April, 1883! in stream, Fleet Mills, Swillington, April, 1883!

16. *Wensleydale*—Canal at Ripon, J. Ingleby, 1883! Fearby Cross, near Masham, H.P., 1877! Birk Rigg, three miles from Hawes, H.C., 1877!

22. *Upper Derwent*—Common in the Mere, Scarborough, H. Appleton, 1884! Scarborough, several, R.M.C., 1883! Seamer Mere, W.C.H., 1879; pond near Cayton Bay, April, 1879!

23. *Chalk Wolds*—Leckonfield Moat, 1880, J.D.B.; Bridlington, on caddis-cases in pond west of railway-line to Scarborough, Easter, 1884, G. Wingate!

24. *Holderness*—Hornsea Mere, June 6th, 1881, W.D.R.! River Hull, at Driffield, moderately common, 1882, L. B. Ross! Beverley, J.D.B.; ditch, strongly impregnated with iron, at Figham! and at New Holland near Meaux, May 29th, 1882, W.D.R.! Leven canal, 1878, J.D.B.!

Var. disciformis Jeffreys.

Planorbis carinatus var. δ lucidus Pascal!

We are inclined to regard as synonymous with this form the variety which Pascal describes as follows:—

'δ LUCIDUS—Shell of medium size, of a horny amber, transparent, glossy, more compressed, keel very sharp.'

M. Pascal remarks, 'It is the most beautiful *P. carinatus* that I have seen.'

7. ***Went Vale***—Askern, H.S., 1882! Sharlston, J. W.
12. ***Lower Calder***—Ossett, about 1877, J.W.!
13. ***Airedale***—Pond at Castleford! Swillington Bridge, J.W.

Var. minor Pascal, 1873.

This variety is described by Pascal in his 'Catal. des Moll. terr. et des eaux douces du dept. de la Haute-Loire et des Environs de Paris,' as being 11 mill. in diam., and as having an altitude of 2½ mill.

12. ***Lower Calder***—Mr. J. Hebden in 1874 recorded a dwarf form as occurring in a pond near Sandal Castle, which probably would be correctly referable to this variety.

Planorbis complanatus (L.).

Abundant in the lowlands.

Planorbis complanatus is more widely distributed in Yorkshire than the preceding species, but is also practically absent from the North-Western dales.

According to Dr. Martin Lister, who wrote in 1678, this species pours forth, when irritated or injured, the same red fluid as *Planorbis corneus.*

Mr. Tye says this species is capable of spinning a mucous thread, but does so much less often than Physa and Limnæa.

Dr. F. Day records, on the authority of Parfitt, that it is occasionally preyed upon by trout, the shells of this and other species having been found in their stomachs.

Dr. Kobelt in his 'Fauna of Nassau' remarks on the curious habit of this species, when living in the aquarium, of crawling out of the water and affixing the underside of their shells to the glass above the surface of the water.

P. complanatus seems to be more liable to distortion than others of the genus. In a stream of water pumped from the coal pits at the place variously called Leventhorpe Pastures, Thorp Hall Pastures, and Waterloo, an abundance of curious and variously contorted specimens were obtained about 1865 by several collectors. This place has not been examined for some years, and it is possible that these peculiar shells may be still obtainable at the same place.

Dr. Gray remarks on the tendency of this species to distortion when living in the ponds of warm water emitted from steam engines in Yorkshire.

In May, 1885, Mr. Knubley found this species abundantly in a subfossil state in a deposit two feet below the surface on the banks of the River Tutt, two miles south of Boroughbridge. It is also found on the moles' hills, and on the arable land at Askern.

Specimens of a Planorbis from Clarence River, New South Wales, named by Mr. Edgar A. Smith, of the British Museum, *Planorbis obtusus* Desh., do not seem to differ in any material degree from our species. Further observations on this point are desirable. In his Monograph of the Freshwater Shells of Australia, published in 1881, Mr. Smith gives Adelaide as the locality of *P. obtusus*, on the ground that four specimens in Cuming's collection have a label Adelaide attached to them.

3. *Vale of York*—York, 1871, W.H.B.; very common about York, W.C.H., 1879; very abundant about York, and found in most suitable ponds or ditches, Askham, Hobmoor, R. Foss, Bishopthorpe Ings, ditches round Huntington, &c., R.M.C., 1881; Knavesmire, July 13th, 1880! Bootham Stray, 1857, W. Whitwell! several in ponds in corners of fields, York, R.M.C., 1883! plentiful in a small reedy ditch-expansion by left side of Foss, above Yearsley Bridge, 1858, W. Whitwell! pond near York, W. West, 1881! Bishop-

thorpe! Middlethorpe Ings, 1865, W. Whitwell! Dringhouses Bog, July, 1879! a few in a pond at Dringhouses, Aug., 1883, G. Webster! common at Askham Bog, Sep. 6th, 1879, W.D.R.! in one of the deeper and more open ditches, Askham Bog, R.M.C., 1879; Naburn Lock, plentiful in 1877, J.G.! Strensall Common, fine, 1880, and July 13th, 1883, H.P.! pond on roadside between Ryther and Ulleskelf, H.P.! Wetherby, May 21st, 1877, H.C.! Tadcaster, Wighill, and pond near Jackson's Wood, Wetherby, F. G. Binnie, 1881; ponds at Ryther! Healaugh Hall, H.C., 1877! common in roadside ditches east of Brafferton, Sep. 11th, 1882, W.D.R.! very common in pond, Church Fenton, June 21st, 1875! stream, Church Fenton! two specimens from pond near Church Fenton Station, 1879! Newton Kyme! pond near Mattram Hall, Sherburn, also in stream crossing road near same place, April 12th, 1868! Minskip! pond at Riccall, June, 1879! Spellow Hill! Bubwith! Bishop Dyke near Milford, July 31st, 1864! and April 12th, 1868! also in the same stream near Cawood! common in a pond near Barlby Bank, Selby, Sep. 6th, 1879, W.D.R.! Asp pond, Knaresborough! Garforth, April 17th, 1876! Brick-pond at Stanks, 1873!

4. ***Humber***—Sluggish stream, Ermine Street, Castleford, March 22nd, 1868! pastures, north of Castleford, in September, G. Roberts; Knottingley, G. T.! Ferrybridge, J.W., 1885; Fairburn, June, 1885, W. Webster! Selby, J.W., 1885; canal near Burton Hall, Oct. 17th, 1880! ditch, Barlow Common! dyke, by river-side, Carlton, near Snaith! Goole, J.W., 1885; Howden! Newsholme Road, near Howden! Newsholme! pond, Wressle! pond, between Wressle and Breighton! pond, near Brackenholme! Newton-le-willows!

5. ***Hatfield and Thorne***—Plentiful in ditches, Ackholme, May 14th, 1883, W.D.R.! plentiful in ditches, Blaxton Grange, May 14th, 1883, W.D.R.! Potteric Carr, J. Emmet.

6. ***Trent***—Ponds Doncaster!

7. ***Went Vale***—Ackworth, common, C.A., 1854; Ackworth, common in several parts, C.A., 1874; school canal and mill dam, Ackworth, G. F. Linney, 1880; Askern, H.S., 1881! Askern Pool, E. Lankester, 1842; ditch, near Balne Moor, Sept., 1877! common in ditch, Cowick Park, Snaith, June 17th, 1882, W.D.R.! Went Vale, W. Graves, 1883; rather plentiful, Norton, April 22nd, 1878! the mill dam, Wintersett, and numerous ponds are the recorded localities—commoner than *P. carinatus*—W. E. Brown, 1880; Went Bridge, Hemsworth, Nostel, and Sharlston, J.W., 1885.

8. ***Dearne***—Abundant in canal from Hoyle Mill to Worsborough Dale, A.P.T., 1885; canal, Barugh, 1877, A.P.T.; Dearne and Dove canal, W. E. Brady, 1885!

11. *Upper Calder*—Halifax, H.C., 1877 ! Luddenden Valley, 1875, J.C.

12. *Lower Calder*—Wakefield and Barnsley Canal, 1871, H.S. ; common throughout the Wakefield district, J.H., 1874; Barnsley canal, J.W., 1883 ; Crofton, Kirkthorpe, and Ryhill, J.W., 1885.

13. *Airedale*—Leeds and Liverpool canal at New Wortley, 1871, H.S. ; and at Calverley, 1872, H.S. ; Lofthouse, common, G.R., 1882 ; Newsam Green near Woodlesford, 1872, H.S.; Swillington Bridge, Jan. 1865 ! and 1872 ! ditch, Leventhorpe Pastures, 1877 ! Waterloo near Buslingthorpe, Leeds, Feb. 1865 ! and April 3rd, 1866 ! Thorp Hall Pastures, Jan. 1865, J.B. ; one specimen from pond, Black Hills, Leeds, June 28th, 1883 ! common in a pond north of Roundhay Lime-hills, March 18th, 1882, W.D.R. ! Manston ! small brook near Wilkinson's Mill, Hunslet, May 7th, 1861, since built over, Goodman-street now occupying the site !

17. *Wensleydale*—Masham ! Fearby Cross, near Masham, H.P., 1877 ; ponds, Masham, April, 1881, J. Carter ! Marfield pond, near Masham, common, H.P. ; Skelton, near Ripon !

18*a*. *Vale of Mowbray*—Vale of Mowbray, W. Grainge, 1859 ; very common in ponds and ditches about Thirsk, J. H. Davies, 1855 ; plentiful in brickponds on Pilmoor, Oct. 7th, 1882, W.D.R. !

20. *Lower Tees*—General in the Lower Tees district, J. W. Watson ; Middlesbrough, B. Hudson, 1883 ; abundant in a small stream bordering the race-course, Mandale Marshes, near Stockton, March 7th, 1885, B. Hudson ; in several waters near Roseberry, 1879, C.A. ; Coatham Marshes, Ferguson's Nat. Hist. of Redcar, 1860.

21. *Eskdale*—On the coast near Whitby, 1875, G. Roberts.

22. *Upper Derwent*—Scarborough, W. Bean, 1871.

23. *Chalk Wolds*—Pond near Leckonfield, 1880, J.D.B.; Bridlington, J. S. Gibbons, 1881 ; Bridlington, abundant in a pond west of railway-line to Scarborough, August, 1885, G. Wingate !

24. *Holderness*—Common everywhere about Beverley, Swinemoor, Kitchen lane, Weel Carrs, Commonbank Nook. and fine in Long lane, J.D.B., 1882 ; ditches at Figham, where water is strongly impregnated with iron, J.D.B., 1880; common at Figham, May 29th, 1882, W.D.R. ! rejectamenta of Beverley Beck, J.D.B. ; common about Hull, J.D.B., 1878 ; Cottingham road, Hull, 1878, J.D.B. ; Spring Dyke, Hull, 1878, J.D.B. ; Holderness road, Hull, 1879, J.D.B. ; fine in ponds at Hornsea Mere, 1881, J.D.B. ; common in Hornsea Mere, June 6th, 1881, W.D.R. ! plentiful in R. Hull at Driffield, L. B. Ross, 1882 ; Wansford, L. B. Ross, 1883 ; common in ditches at Meaux, May 29th, 1882, W.D.R. !

Var. rhombea (Turton).

Planorbis draparnaldi Shepp. has, by some conchologists, been confounded with this variety, from which it is, of course, very distinct.

Dr. Gray considered that this variety—the *Helix rhombea* of Turton—is only the young state of *P. complanatus*.

3. ***Vale of York***—A few in a pond at Bishopthorpe, and in one of the Hobmoor ponds, R.M.C., 1881; pond near York, immature, Feb. 22nd, 1885, W.C.H.! brick-pond at Stanks, near Seacroft, 1871! near Harrogate, Lister Peace, 1880!

7. ***Went Vale***—Pond in a field about 300 yards above Wentbridge, H. Richardson, 1883; near Norton, 1884, G. Roberts; Askern, 1884, G. Roberts.

12. ***Lower Calder***—Barnsley canal, J.W., 1883.

Var. albinos Baudon, 1859.

Planorbis complanatus var. 2 albida Jeffreys, 1862.

4. ***Humber***—A wide ditch at Fairburn, July, 1885, G. Roberts!

Monst. sinistrorsum Taylor.

Shell reversed (Journal of Conchology, vol iv. p. 37, 1883).

7. ***Went Vale***—Askern, J. Wilcock.

Monst. terebrum Turton, 1819.

Monst. trochiformis Baudon, 1884.

Dr. Baudon published no description of the form he names monst. *trochiformis*, but the figure he gives (Journal de Conchyliologie, vol. xxiv., pl. x., fig. 2, 1884) shows conclusively that it is identical with monst. *terebrum*.

6. ***Trent***—Doncaster, J.W., 1885!

13. ***Airedale***—Leventhorpe Pastures, May 16th, 1864, J.B.; one specimen in a small brook near Wilkinson's mill, Hunslet, 1860, since built over, Goodman Street now occupying the site!

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Subgenus CORETUS Adanson.

Shell depressed, not keeled, slightly umbilicated above, smooth, whorls increasing somewhat rapidly; the last moderate in size, without interior lamellæ; aperture broadly semilunar (Moquin-Tandon, 'Hist. Nat. d. Mollusq. terr. et fluv. de France,' ii. p. 445).

Planorbis corneus (L.).

Not uncommon in the lowlands.

Many of the recorded localities of this species, especially near the towns, are ponds or ditches, where they have been introduced by conchologists or others, being a favourite aquarium shell. Wherever we have been able to obtain definite information about its introduction to any pond or other place, we have stated the fact when quoting the locality.

Mr. Wilcock found numbers of subfossil specimens near Conisborough in 1873, and in May, 1885, Mr. W. D. Roebuck found a few with *P. complanatus*, &c., in a bed on the banks of the River Tutt, two miles south of Boroughbridge. One specimen was obtained by Rev. E. P. Knubley, in 1885, on the site of an old pond at Staveley. *P. corneus* is also numerous at Askern, thrown up by moles or exposed by the ploughing of the land.

Dr. Martin Lister, as long ago as 1678, gave a full account of the red fluid secreted so abundantly by this species, which we think of sufficient interest to reproduce here:—

'It emits a red humour if a little salt of any kind, or a little pepper or ginger, be placed in the aperture of the shell. It is doubtful whether this really comes from the body like blood from a cut, though I have seen it emitted from a tentacle broken off close to the head, and also to flow from a slight puncture of the body. Experiments that would establish with certainty whether the fluid comes from a wound or not are

made with difficulty. The fluid is very probably the saliva around the throat and stomach, or a peculiar humour contained in its own special receptacle. This humour probably exists throughout the year, but is certainly present in April and September. The fluid can be quickly obtained in great quantity, by throwing into a linen bag plenty of the snails, and sprinkling a little salt upon them, whereupon the red fluid is instantly and copiously distilled. If powdered alum be sprinkled on the humour so distilled, the coloured part forthwith settles down, and the remainder becomes as limpid as water. If the experiment with salt and alum be made in the same manner on the blueish humour emitted from an incision by several terrestrial snails, nothing coloured is thrown down, and the whole is hardened into a blueish gluten. The coloured part of the fluid of *P. corneus* can be separated with bibulous paper, but the beauty of the colour perishes, changing to a dark sordid hue. If on the contrary it be mixed with vinegar or spirit of wine, or salt dissolved out of dried cleansed plants, or common salt diluted not otherwise than with alum, the bright red of this humour perishes. When the fluid has been emitted voluntarily we have still in vain tried to preserve it in narrow jars with well-closed mouths, but with oil thrown over, or drenched with honey.'

A variation to bright flesh or pink in the colour of the animal itself was noticed by Mr. Nelson, near Leeds, during the summer of 1878. The locality was a small cattle pond near the Black Hills, one end of which sustains a dense growth of reed, *Elodea canadensis*, *Callitriche verna*, *Lemna minor*, and several freshwater algæ, the opposite end being shallow and quite destitute of plant life. The molluscan inhabitants found amongst the vegetation were a dwarf form of *Sphærium lacustre*, and an abundance of *Pisidium pusillum* and *Planorbis nautileus*. The shallow end of the pond was tenanted by the *P. corneus*, many of them having the animal pink or bright flesh colour, rendering them very conspicuous. The peculiarity was to some extent shared by the shells, which were much thinner, more

diaphanous, and suffused with a slight tinge of pink. The operating cause would appear to have been but temporary, as not a single individual exhibiting the variation could be found during the following season.

Mr. Butterell has also recorded the finding in Spring Dyke, near Hull, in 1879, of a number of specimens exhibiting the same peculiarities.

3. *Vale of York*—River Fosse near York, in great plenty (Martin Lister, 1678). Common about York, Strensall, Askham, Hobmoor, stream beside the Foss, Bishopthorpe, &c., especially good at times near the latter place, R.M.C., 1881; ditches, York, J. Emmet, 1883; one place near York, W.H.B.; Middlethorpe Ings, York, 1865, R. Whitwell; stream near Bishopthorpe, R.M.C.; pond by Clifton Ings, H. Richardson; Knavesmire, J. Emmet; Askham Bog, in one of the deeper and more open ditches, R.M.C., 1879! Askham Bog, abundant, June 2nd, 1879, W.D.R.! encrusted specimens in a small reedy expansion of a ditch by the Foss, in a field above Yearsley Bridge, York, 1858, W. Whitwell; Strensall Common, W.C.H., 1879; Strensall Common, local, but abundant, the specimens unusually fine, W. Hewett, 1884; pond, near the Vicarage, Riccall, June, 1879! Tockwith! Milford House, near Church Fenton, one specimen, August 20th, 1881, W.D.R.! stream crossing road near Mattram Hall, Sherburn, April 12th, 1868! Bishop Dyke, near Hambleton, July 3rd, 1864, and April 12th, 1868! Milford Junction, June, 1876, G. Roberts; Garforth, April 17th, 1876!

4. *Humber*—Abundant in a pond at Castleford, evidently introduced, J.H., 1874; plentiful, in various stages of growth, in a shallow muddy pond in the pastures near the new iron railway bridge at Castleford, June 15th, 1885, G. Roberts; ditches in pastures north of Castleford, G. Roberts; pond near Fairburn, mostly young, June, 1885, G. Roberts; Breighton, near Bubwith, Sept. 4th, 1880, W.R.D.! Newsholme Road, near Howden, January! Goole district, R.D.M.; Wressle, 1884, G. Roberts; Selby, 1876, G. Roberts; ditch, by canal, Selby! South Milford, G. Roberts, 1876.

5. *Hatfield and Thorne*—Ditch, parallel with Black Bank Drain, young ones plentiful, no old ones seen, April 14th, 1883, W.D.R.! Potteric Carr, J.E., 1884.

7. *Went Vale*—Abundant in ditch, Cowick Park, June 17th, 1882, W.D.R.! Askern Pool, E. Lankester's Askern, 1842; Askern, H.S., 1882! South Elmsall, J.W., 1885; Pontefract, J. W. Wood!

8. *Dearne*—Found in a pond near Doncaster in 1884, by W. Gelder, A.P.T.; Denby Dale, J.W.

12. *Lower Calder*—Mill-pond, Gomersall, Dec., 1878, G.T.! naturalised in several ponds round Wakefield, where at different times I have placed them, J.W., 1885; two years ago it occurred in a small pond near Wakefield, but it had been introduced, G. Roberts, 1885; introduced at Newton, near Wakefield, G. Roberts, 1885.

13. *Airedale*—Plentiful in 1864, in pond, Stoney Rock, Leeds! pond now filled up! pond, near Thorne's Farm, Osmondthorpe, 1884! immature specimen in August, 1877! now filled up! very abundant in pond near Dog and Gun Inn, York Road, Leeds, May 31st, 1868! pond at Black Hills, Leeds, Sept., 1878! common in pond, Foundry Lane, Leeds, June 27th, 1866! and June 23rd, 1872! pond, High Coldcotes! numerous in a small brook behind Wilkinson's Mill, Hunslet, May 7th, 1861! since built over, Goodman Street now occupying the site! pond, near Seacroft Hall, 1874! Allerton Bywater! common in pond, Baildon Green, June, 1883, W. West! The pond at Baildon was stocked by Mr. S. R. Hallam, now of Burton-on-Trent, when resident at Shipley or Bradford, H. T. Soppitt, 1885; tannery pond, Kirkstall! pond, Horsforth Woodside, one specimen, Jan. 18th, 1885!

17. *Wensleydale*—Canal, Ripon, very common, April, 1884, J. Ingleby! common in Marfield pond, H.P.! common in ponds at Masham, April, 1881, J. Carter!

18*a*. *Vale of Mowbray*—Vale of Mowbray, Grainge, 1859; plentiful in a pond near Topcliffe, sometimes curiously deformed, J. H. Davies, 1855! common in brickponds on Pilmoor, Oct. 7th, 1882, W.D.R.!

20. *Lower Tees*—Placed three years ago in a small pond on Redcar sea banks, near Rifle Range, but did not see any in the pond in spring, 1884, B. Hudson.

22. *Upper Derwent*—Scarborough, W.B.; the Mere, Scarborough, common, H. Appleton! Seamer mere, W.C.H.

23. *Chalk Wolds* — Brantingham, J.D.B.; Burlington, J.S.G., 1881; Bridlington, numerous in a pond near railway, on west side of line to Scarborough, April 12th, 1884, and Aug., 1885, G. Wingate! common and very large in Boynton fishponds, Aug. 6th, 1883, L. B. Ross!

24. *Holderness*—Generally distributed about Hull, very plentiful in Spring Dyke, J.D.B., 1878; Cottingham Road, Hull, 1878, Holderness Road, Hull, 1879, Beverley, 1880, J.D.B.; Beverley Parks, rejectamenta of Beverley Beck, 1880, Swinemoor, near Beverley, 1880, fine at Long Lane, Beverley, 1881; in a ditch strongly impregnated with iron, Figham, J.D.B., 1881; one specimen at Figham, May 29th, 1882, W.D.R.! moderately plentiful in drains at Foston and Brigham, L. B. Ross, 1883; Hornsea Mere, 1881, J.D.B.

Var. major Pascal, 1873.

Planorbis grandis Dunker.
Planorbis inflatus Dunker.

Var. α MAJOR, diam. 31 mill., haut. 14 mill.—Pascal, Moll. Haute Loire et Paris, p. 56, 1873.

Dr. Kobelt quotes *Planorbis grandis* and *P. inflatus* of Dunker as synonyms of this variety.

Mr. E. J. Lowe records that specimens living in a muddy brook at Beeston, Notts., into which a constant supply of warm water is discharged, attained a diameter of 1½ inches.

3. ***Vale of York.***—Strensall Common, July, 1880! some specimens 34 mill. diam.

23. ***Chalk Wolds***—Three specimens gathered at Boynton Fish Ponds, on Aug. 6th, 1883, were of the following dimensions, 33 × 13, 35 × 14, and 35 × 14 mill.! and Mr. L. B. Ross informs us he has seen larger from the same locality.

Var. minor Pascal, 1873.

Planorbis similis Bielz.

Var. ζ MINOR, diam. 18-20 mill., alt. 7-9 mill., with a very black and rather broad border encircling the aperture, and appearing on the callosity which unites the two edges.—Pascal, Moll. Haute Loire et Paris, p. 56, 1873.

13. ***Airedale***—A few have been obtained from the pond at Black Hills, near Leeds.

Sub-genus BATHYOMPHALUS, Agassiz.

Shell depressed, not keeled, widely and deeply umbilicated below, the whorls increasing very slowly, the last a trifle broader than the penultimate; aperture narrowly semilunar (Moquin-Tandon, 'Hist. Nat. d. Mollusq. terr. et fluv. de France,' ii., p. 445).

Planorbis contortus (L.).

Widely distributed and locally common.

This species is widely dispersed in Yorkshire, being found in seventeen of the twenty-five districts into which the county is divided. It is local and usually abundant where it occurs.

The specimens from Dringhouses Bog near York, collected in June 1879, seem to be referable to Arnould Locard's variety *subrufa*.

Sub-fossil specimens are thrown up by the moles about Askern on what is probably the site of an ancient lake. Mr. Roebuck also found it abundantly with other species in the deposit on the banks of the R. Tutt, near Boroughbridge.

Like *Planorbis corneus* this species spins a mucous thread very much less often than Physa and Limnæa, according to the observations of Mr. G. S. Tye.

Mr. Nelson found a specimen in 1883 with the animal of a bright pink in the same pond at the Black Hills, Leeds, which produced so abundantly in 1879 a similar variation in *Planorbis corneus*.

2. ***Lune and Ribble***—Common in pond by river, Gisburn, April 18th, 1881, W.D.R.!

3. ***Vale of York***—Abundant, but always small, both at Askham and Hobmoor; larger at Bishopthorpe; immense numbers of exceedingly fine specimens in a tiny pond—than which I never saw a filthier—near the south end of Scarborough railway bridge, R. M. Christy, 1881; common in ponds in corners of fields, R.M.C., 1883; common in Askham Bog, June 2nd, 1879, W.D.R.! also July 1882, G. Webster! several in a ditch near the Ouse, below York, 1865, W. Whitwell; pond, Knavesmire! Clifton Ings, W. C. Hey; stream, near Church Fenton Station! pond, near Church Fenton Station, 1879! Sherburn, 1870, G. Roberts; pond, near the Ouse at Selby! Bishop Dyke, near Selby! Selby, 1867 and 1876, G. Roberts; Bishop Dyke, near Hambleton, July 31st, 1864! Milford Junction, June, 1876, G. Roberts; South Milford, 1876, G. Roberts; pond at Thorparch; ditch, between Newton Kyme and Tadcaster; Boston Spa, 1856, J. Emmet; Wighill, F. G. Binnie; pond, at Staveley! Garforth, April 17th, 1876!

4. ***Humber***—Goole district, R. D. Maxwell, 1876; dumps at Carlton Park, &c., near Snaith! Roall, J. W. Wood! ditch, Barlow Common, Aug., 1881! Selby, 1867 and 1876, G. Roberts; lake, Fryston Park, July 1st, 1871, G. Roberts; very abundant in ponds, near Fryston Hall, J. Hebden, 1874; Newthorpe, Feb. 12th, 1882! Ferrybridge, J. Wilcock, 1883; abundant in ponds at Castleford! broad ditches in pastures, north of Castleford, Sept., G. Roberts; stream, Ermine Street, Castleford, March 22nd, 1868! Newton, near Castleford, 1870, G. Roberts; South Milford, G. Roberts, 1876.

5. ***Hatfield and Thorne***—Abundant in ditches bordering Black Bank Drain, April 14th, 1883, W.D.R.! common in ditches about Ackholme; in the River Torne, and in ditches about Blaxton Grange, May 14th, 1883, W.D.R.! ponds. Doncaster!

6. *Trent*—Doncaster, J. Wilcock, 1885.
7. *Went Vale*—Campsall Park, J. Wilcock, 1885.
10. *Colne*—Not uncommon in Huddersfield canal, J. Whitwham, 1877.
11. *Upper Calder*—Halifax, H. Crowther! Cooper Bridge, Brighouse, Mirfield, J. Wilcock, 1885.
12. *Lower Calder*—Dewsbury, Isaac Binns, 1862; Ossett, J. Wilcock, 1883! Newton, pond near Silcoates, and Barnsley canal, J.W., 1885.
13. *Airedale* — Micklethwaite, near Bingley, March 12th, 1882! near Bingley, Sept. 7th, 1884, H. T. Soppitt; excessively abundant in a pond near Allerton Bywater, March 25th, 1864! Methley, G. Roberts; one or two ponds near Castleford, June 6th, 1870, G. Roberts; Swillington, June 30th, 1872! Newsam Green near Woodlesford, 1872, H. Shaw; common at Rothwell, H. Shaw! Haigh Park, near Hunslet! Leventhorpe Pastures, March, 1883! pond at Black Hills, not uncommon, June 28th, 1883; Leeds and Liverpool canal, Newlay!
14. *Malhamdale*—Abundant, though small, in Malham Tarn, Sept. 1st, 1883, W.D.R.! ditch, Skipton, E. Collier, 1885!
17. *Wensleydale*—River Ure, Tanfield, J. Dalton, 1859; abundant in pond at Staveley, Aug. 27th, 1883, E. P. Knubley! numerous in Staveley fish pond, May 25th, 1885, W.D.R.! pond at Copgrove!
18*a*. *Vale of Mowbray*—Vale of Mowbray, Grainge, 1859; plentiful in ponds and ditches about Thirsk, J. H. Davis, 1855; abundant in brick ponds on Pilmoor, Oct. 7th, 1882, W.D.R.!
20. *Lower Tees*—General in Lower Tees district, J. W. Watson, 1881; several waters near Roseberry in Cleveland, 1879, C. Ashford; a few from a stell on inland side of Coatham Marshes, B. Hudson, 1885.
22. *Upper Derwent*—Scarborough, W. Bean, 1871.
23. *Chalk Wolds*—Bridlington, plentiful on caddis-cases, in pond on west side of railway line to Scarborough; Easter, 1884, G. Wingate! Bridlington, 1867, G. Roberts.
24. *Holderness*—Very abundant about Beverley, at Swinemoor, Figham, drift of Beverley Beck, Kitchen Lane and pond near England Springs, J.D.B., 1882; ditch at Figham, strongly impregnated with iron, J.D.B., 1880; Wansford, L. B. Ross, 1883; Newland, Hull, 1878, Cottingham Road and Spring Dyke, 1885, J.D.B.; Hornsea Mere, common, June 6th, 1881, W.D.R.! common at Meaux, and at New Holland, near Meaux, May 29th, 1882, W.D.R.!

Var. albida Jeffreys.

3. *Vale of York*—Ditch near the Ouse, below York, 1865, W. Whitwell!
4. *Humber*—Several at Ferrybridge, 1871, J. Wilcock; a mature but dwarf specimen in a sluggish stream at Castleford, 1866!

Coleophora juncicolella *Stn.* Larva feeds on heath.

Scarborough (*H. T. Stainton, Ent. Ann.*, 1858, *p.* 110); Sheffield (*A.D.*); York (*Stainton's Manual*).

Coleophora laricella *Hüb.* Among larch.

Doncaster !! (*W. W.*); Harrogate !! (*J. Sang*); Richmond !! (*J. Sang*); Sheffield (*A.D.*); York (*T. Wilson*).

Coleophora albitarsella *Zell.* Larva feeds on ground ivy, &c.

Doncaster (*W. W.*); Richmond (*J. Sang*); Scarborough (*T. W.*).

Coleophora nigricella *Steph.* Common; larva on hawthorn, &c.

Doncaster (*W. W.*); Harrogate !! (*J. Sang*); Redcar !! (*J. Sang*); Richmond !! (*J. Sang*); Scarborough !! (*J. Sang*); Sheffield (*A.D.*); York !! (*T. Wilson*).

Coleophora fuscedinella *Zell.* Doncaster (*W. W.*); Harrogate !! (*J. Sang*); Redcar !! (*J. Sang*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); York ! (*T. Wilson*).

Coleophora gryphipennella *Bouche.* Larva feeds on leaves of rose.

Doncaster !! (*W. W.*); Richmond !! (*J. Sang*); Scarborough !! (*P.I.* and *J. Sang*); Sheffield (*A.D.*); York ! (*T. Wilson*).

Coleophora siccifoliella *Stn.* Scarborough, on whitethorn. (*T. W.*).

Coleophora Wilkinsonella *Scott.* This species was named after Mr. Thomas Wilkinson, by whom it was first bred from larvæ found on birch leaves at Scarborough, about the year 1858. Since then Mr. Sang has also found it at Richmond.

Coleophora vitisella *Gregs.* Larva feeds on *Vaccinium vitis-idæa.*

Sheffield (*A.D.* and *W.W.*). I have no doubt this species would readily be found in other suitable localities in the south West Riding.

Coleophora viminetella *Zell.* Larva on leaves of sallow.

Doncaster (*W.W.*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York ! (*T. Wilson*).

Coleophora olivaceella *Stn.* Scarborough (*T.W.*); Sheffield (*H. T. Stainton, Ent. W. Int., April* 20, 1861).

Coleophora solitariella *Zell.* Larva on leaves of *Stellaria holostea.*

Harrogate (*J. Sang*); Ripon (*J. Sang*); Scarborough (*T.W.*); York (*T. Wilson*).

Coleophora lutipennella *Zell.* Among oaks, &c.

Doncaster (*W.W.*); Huddersfield (*P.I.*); Richmond! (*J. Sang*); Scarborough (*T.W.*); York (*T. Wilson*).

Coleophora badiipennella *Fisch.* Doncaster (*W.W.*); Scarborough ! (*Stainton's Manual*); York (*Stainton's Manual*).

Coleophora limosipennella *Fisch.* Ripon (*J. Sang*); York (*T. Wilson*).

Coleophora chalcogrammella *Zell.* This beautiful species was first discovered as British by Mr. T. Wilkinson, who found the larvæ feeding on the leaves of *Cerastium arvense* at Scarborough, in May, 1857; the perfect insects appeared the following month (see *Entomologist's Annual*, 1858, *p.* 93).

Batrachedra præangustella *Haw.* Among sallow, &c.

Doncaster (*W.W.*); Harrogate!! (*J. Sang*); Richmond!! (*J. Sang*); Scarborough !! (*T.W.*); Sheffield (*A.D.*); York (*Stainton's Manual*).

Oinophila V-flavella *Haw.* Scarborough, common in wine vaults (*T.W.*).

Chauliodus chærophyllella *Goe.* Scarborough (*T. W.*); York ! (*Stainton's Manual*).

Laverna paludicolella *Dbl.*=**propinquella** *Stn.* Larvæ on *Epilobium hirsutum* and *roseum* in February and March; imagos frequent ragwort flowers in the daytime (*T. W.*).

Doncaster (*W. W.*); Flamborough Head (*E. H.*); Scarborough !! (*J. Sang* and *T. W.*); York (*Stainton's Manual*).

Laverna lacteella *Steph.* Huddersfield (*Hobkirk's History of Huddersfield*); Scarborough ! (*Stainton's Manual*); York (*Stainton's Manual*).

Laverna miscella *W. V.* Larvæ in leaves of *Helianthemum.* Richmond ! (*J. Sang*); Scarborough (*T. W.*).

Laverna conturbatella *Hüb.* Bramham (*J. Sm.*).

Laverna Stephensiella *Stn.* Rotherham (*W. Simmons, Ent. W. Int.*, 1859, *p.* 147).

Laverna epilobiella *Schr.* Larva feeds on *Epilobium hirsutum.*

Doncaster (*W. W.*); York ! (*T. Wilson*).

Laverna ochraceella *Curt.* Larvæ in roots and stems of *Epilobium* at Scarborough !! (*J. Sang* and *T. W.*); York ! (*T. Wilson*).

Laverna Hellerella *Dup.*=**atra** *Haw.* Among hawthorn, &c.

Doncaster (*W. W.*); Richmond (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A. D.*); York ! (*T. Wilson*).

Chrysoclista Schrankella *Hüb.* Scarborough, common on *Epilobium* (*T. W.*); Sheffield (*A. D.*).

Chrysoclista bimaculella *Haw.* Mr. T. Wilson took this rare species by beating, at York, in 1882.

Chrysoclista flavicapitella *Haw.* Balby, near Doncaster (*W. W.*); Huddersfield (*P.I.*); Richmond (*J. Sang*); Scarborough !! (*Stainton's Manual*); York ! (*Stainton's Manual*).

Asychna modestella *Dup.* Among *Stellaria holostea.* York (*Stainton's Manual*).

Asychna fuscociliella *Stn.*=**Coleophora fuscocuprella** *H.S.* Doncaster !! (*G.T.P.*); York, on nut leaves (*T. Wilson, Ent. Mo. Mag.*, xvi. 211).

Asychna terminella *Dale.* Scarborough, on enchanter's nightshade !! (*T. W.* and *J. Sang*).

Chrysocoris festaliella *Hüb.* Among bramble and raspberry.

Doncaster (*W. W.*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough (*T. W.*); York ! (*Stainton's Manual*).

Antispila Pfeifferella *Fab.* Larva in leaves of dogwood. Doncaster (*W. W.*); Scarborough (*T. W.*).

Antispila Treitschkiella *Fisch.* Scarborough, on leaves of dogwood (*T. W.*).

Stephensia Brunnichella *L.* Among *Clinopodium vulgare.* Richmond (*J. Sang*).

Elachista Gleichenella *Fab.* Scarborough, larvæ plentiful on *Luzula pilosa* (*T. W.*); York (*Stainton's Manual*).

Elachista magnificella *Tengs.* Doncaster (*J. Hawley*); Sheffield (*A.D.*).

Elachista apicipunctella *Stn.* Huddersfield (*P.I.*); York (*Stainton's Manual*).

Elachista albifrontella *Hüb.* Flamborough Head (*E.H.*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); York ! (*T. Wilson*).

Elachista atricomella *Stn.* About *Dactylis glomerata.* Doncaster (*W. W.*); Huddersfield (*P.I.*); Scarborough (*T. W.*); York (*Stainton's Manual*).

Elachista luticomella *Zell.* Larva on *Dactylis glomerata.* Flamborough Head (*E.H.*); Huddersfield (*P.I.*); Scarborough (*T. W.*); York (*Stainton's Manual*).

Elachista Kilmunella *Stn.* Among *Carex* in boggy places. Huddersfield (*P.I.*); Richmond (*J. Sang*); Scarborough (*T. W.*).

Elachista cinereopunctella *Haw.* Among *Carex glauca.* Huddersfield (*P.I.*); Scarborough !! (*T. W.*); York ! (*Stainton's Manual*).

Elachista trapeziella *Stn.* Scarborough, among *Luzula pilosa* (*T. W.*); on the Yorkshire side of Barnard Castle (*J. Sang*).

Elachista stabilella *Stn.* Scarborough (*T. W.*).

Elachista nigrella *Hüb.* Huddersfield (*P.I.*); Scarborough !! (*Stainton's Manual*); York ! (*Stainton's Manual*).

Elachista subnigrella *Dougl.* Scarborough ! (*Stainton's Manual*).

Elachista perplexella *Stn.*=**humiliella** *Zell.* Scarborough, larva in leaves of *Aira cæspitosa* (*T. W.*).

Elachista Bedellella *Sircom.* Huddersfield (*P.I.*); Scarborough ! (*T. W.*).

Elachista subobscurella *Dbl.* Doncaster (*W. W.*); Huddersfield (*P.I.*); Richmond (*J. Sang*); Scarborough ! (*Stainton's Manual*); York ! (*Stainton's Manual*).

Elachista Gangabella *Fisch.* York (*Stainton's Manual*).

Elachista tæniatella *Stn.* Scarborough, plentiful on *Brachypodium sylvaticum* (*T. W.*).

Elachista megerlella *Zell.* Scarborough !! (*Stainton's Manual*); York (*Stainton's Manual*).

Elachista adscitella *Stn.* Scarborough (*T. W.*); York (*Stainton's Manual*).

Elachista cerussella *Hüb.* Scarborough !! (*Stainton's Manual*); York (*T. Wilson*).

Elachista rhyncosporella *Stn.* Richmond (*J. Sang*); Scarborough !! (*Stainton's Manual*); York ! (*Stainton's Manual*).

Elachista eleochariella *Stn.* Scarborough, on cotton-grass (*T. W.*); York (*Stainton's Manual*).

Elachista biatomella *Stn.* Scarborough, on *Carex glauca* (*T. W.*).

Elachista serricornella *Logan.* Scarborough (*T. W.*).

Elachista triatomella *Haw.* Flamborough Head (*E. H.*); Richmond (*J. Sang*); Scarborough, common about fescue-grass (*T. W.*); York (*R. Hind*).

Elachista collitella *Fisch.*=**subocellea** *Steph?* Scarborough (*Stainton's Manual*).

Elachista pollinariella *Zell.* Larvæ in leaves of *Brachypodium sylvaticum.*

Richmond (*J. Sang*); Scarborough !! (*T. W.*).

Elachista rufocinerella *Haw.* Abundant no doubt everywhere among grass.

Doncaster (*W. W.*); Huddersfield ! (*G. T. P.*); Richmond (*J. Sang*); Wakefield !! (*G. T. P.*).

Elachista subochreella *Dbl.*=**ochreella** *Stn.* Richmond (*J. Sang*); York ! (*Stainton's Manual*).

Elachista cygnipennella *Hüb.* Abundant probably everywhere.

Doncaster (*W. W.*); Flamborough Head (*E. H.*); Huddersfield !! (*G. T. P.*); Richmond (*J. Sang*); Scarborough ! (*G. T. P.*); Sheffield (*A. D.*); York ! (*T. Wilson*).

Tischeria complanella *Hüb.* Larva feeds in oak leaves.

Doncaster (*W. W.*); Harrogate (*J. Sang*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); York (*T. Wilson*).

Tischeria emyella *Dup.*=**marginea** *Haw.* Larva in leaves of bramble.

Doncaster (*W. W.*); Scarborough (*Stainton's Manual*); Sheffield (*A.D.*); York (*Stainton's Manual*).

Tischeria angusticolella *Heyd.* Sheffield (*A.D.*).

Lithocolletis roborella *Zell.* Larva in a large mine in oak leaves.

Doncaster (*W. W.*); Huddersfield (*P.I.*); Richmond (*J. Sang*); Scarborough (*T. W.*); Sheffield (*A.D.*); York (*T. Wilson*).

Lithocolletis amyotella *Dup.* Richmond (*J. Sang*); Scarborough (*T. W.*); York (*Stainton's Manual*).

Lithocolletis quinqueguttella *Stn.* Larva in leaves of dwarf sallow.

Scarborough (*T. W.*); York (*P.I.*, *Naturalist*, 1864).

Lithocolletis irradiella *Scott*=**Lautella** *Zell.* var. Larva in oak leaves.

Scarborough (*T. W.*); York (*Stainton's Manual*).

Lithocolletis Bremiella *Zell.* Scarborough (*T. W.*).

Lithocolletis vacciniella *Scott.* Larva feeds on *Vaccinium vitis-idæa.*

Harrogate ! (*J. Sang*); Scarborough (*T. W.*); Sheffield (*A.D.* and *W. W.*).

Lithocolletis pomifoliella *Zell.* Among hawthorn and apple; a common species.

Doncaster, also the variety **mespilella** (*W. W.*); Harrogate (*J. Sang*); Huddersfield (*P.I.*); Richmond (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York ! (*Stainton's Manual*).

Lithocolletis corylella *Nicelli.* Larva in hazel leaves.
Edlington Wood (*W. W.*); Harrogate !! (*J. Sang*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York ! (*Stainton's Manual*).

Lithocolletis spinicolella *Zell.* Among blackthorn.
Harrogate (*J. Sang*); Hexthorpe near Doncaster (*W. W.*); Richmond !! (*J. Sang*); Scarborough (*T. W.*); Sheffield (*A.D.*); York (*T. Wilson*).

Lithocolletis faginella *Mann.* Among beech.
Doncaster (*W. W.*); Harrogate (*J. Sang*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough ! (*Stainton's Manual*); Sheffield (*A.D.*); York ! (*T. Wilson*).

Lithocolletis salicicolella *Sircom.* Among sallow.
Doncaster (*W. W.*); Scarborough (*T. W.*).

Lithocolletis viminetella *Stn.* Scarborough (*T. W.*).

Lithocolletis ulmifoliella *Hüb.* Among birch.
Doncaster (*W. W.*); Harrogate !! (*J. Sang*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); York ! (*Stainton's Manual*).

Lithocolletis spinolella *Dup.* Doncaster (*W. W.*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); York ! (*Stainton's Manual*).

Lithocolletis quercifoliella *Fisch.* Among oak.
Doncaster (*W. W.*); Harrogate !! (*J. Sang*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); York ! (*T. Wilson*).

Lithocolletis Messaniella *Zell.* Among oaks, &c.
Bramham (*J. Sm.*); Doncaster (*W. W.*); Huddersfield (*P.I.*); Scarborough (*Stainton's Manual*); York ! (*T. Wilson*).

Lithocolletis corylifoliella *Haw.* Among hawthorn.
Doncaster (*W. W.*); Harrogate ! (*J. Sang*); Huddersfield (*P.I.*); Scarborough (*P.I.*); York ! (*Stainton's Manual*).

Lithocolletis Caledoniella *Stn.* Also among hawthorn. Mr. Sang says this species is a variety of *L. corylifoliella.*

Doncaster (*W. W.*); Richmond (*J. Sang*); Scarborough !! (*T. W.*); York (*Stainton's Manual*).

Lithocolletis viminiella *Sircom.* Among sallow.

Scarborough !! (*Stainton's Manual*); York (*Stainton's Manual*).

Lithocolletis alnifoliella *Hüb.* Among alder.

Blubberhouses (*Lord Walsingham*); Doncaster (*W. W.*); Harrogate !! (*J. Sang*); Huddersfield (*P.I.*); Maltby (*H. T. Stainton, Zool.*, 1848, *p.* 2273); Richmond!! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York ! (*Stainton's Manual*).

Lithocolletis Heegeriella *Zell.* Among oak.

Huddersfield (*P.I.*); Scarborough (*T. W.*); York (*Stainton's Manual*).

Lithocolletis Cramerella *Fab.* Among oak.

Doncaster (*W. W.*); Harrogate !!(*J. Sang*); Huddersfield (*P.I.*); Richmond!! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York ! (*T. Wilson*).

Lithocolletis acerifoliella *Zell.*=**sylvella** *Haw.* Among maple.

Harrogate ! (*J. Sang*); Hexthorpe near Doncaster (*W. W.*); Huddersfield (*Hobkirk's History of Huddersfield*); Scarborough !! (*T. W.*); York (*Stainton's Manual*).

Lithocolletis emberizæpennella *Bouch.* Doncaster (*W. W.*); Huddersfield (*P.I.*); Scarborough (*T. W.*); York ! (*Stainton's Manual*).

Lithocolletis Frolichiella *Zell.* Among alder.

Harrogate ! (*J. Sang*); Hexthorpe near Doncaster (*W. W.*); Scarborough (*T. W.*); York ! (*Stainton's Manual*).

Lithocolletis Dunningiella *Stn.* Huddersfield (*P.I.*); Scarborough (*T.W.*); York (*Stainton's Manual*).

Lithocolletis Nicelliella *Zell.* Among hazel.
Edlington Wood near Doncaster (*W.W.*); Harrogate !! (*J. Sang*); Richmond !! (*J. Sang*); Scarborough (*T.W.*).

Lithocolletis Stettinella *Nicelli.* Among alder.
Harrogate (*J. Sang*); Scarborough !! (*Stainton's Manual*); York (*P.I., Naturalist*, 1865).

Lithocolletis Klemannella *Fab.* Harrogate (*J. Sang*); Scarborough (*Stainton's Manual*).

Lithocolletis Schreberella *Fab.* Among elm.
Doncaster (*W.W.*); Scarborough (*T.W.*).

Lithocolletis insignitella *Zell.* Scarborough, common on *Trifolium medium* (*T.W.*).

Lithocolletis tristrigella *Haw.* Among elm.
Richmond !! (*J. Sang*); Scarborough (*Stainton's Manual*).

Lithocolletis trifasciella *Haw.* Among honeysuckle.
Doncaster (*W.W.*); Huddersfield (*P.I.*); Richmond! (*J. Sang*); Scarborough (*T.W.*); Sheffield (*A.D.*); York (*Stainton's Manual*).

Lyonetia Clerckella *L.* Doncaster (*W.W.*); Harrogate ! (*J. Sang*); Richmond ! (*J. Sang*); Scarborough !! (*Stainton's Manual*); York ! (*T. Wilson*).

Cemiostoma spartifoliella *Hüb.* Among broom.
Scarborough ! (*T.W.*); Sheffield (*A.D.*); York ! (*Stainton's Manual*).

Cemiostoma laburnella *Heyd.* Among laburnum.
Bramham (*J.Sm.*); Doncaster (*W.W.*); Sheffield (*A.D.*); York ! (*W.P.*).

Cemiostoma orobella *Stn.* First discovered as new to science by Mr. T. Wilkinson, in 1867. He bred it from larvæ found feeding in the leaves of *Orobus tuberosus* at Scarborough (*Ent. Ann.*, 1870, *p.* 158).

Cemiostoma scitella *Zell.* Among hawthorn.

Doncaster (*W. W.*); Richmond !! (*J. Sang*); Scarborough (*Stainton's Manual*); Sheffield (*A.D.*); York ! (*Stainton's Manual*).

Cemiostoma lotella *Stn.* Another species first discovered as new by Mr. T. Wilkinson. He found it in 1858 on *Lotus major* on Cloughton Moor, near Scarborough, and since then it has been collected there in plenty.

Opostega crepusculella *Fisch.* Scarborough !! (*Stainton's Manual*); York ! (*Stainton's Manual*).

Bucculatrix aurimaculella *Stn.* Among *Chrysanthemum leucanthemum.*

Hexthorpe near Doncaster !! (*W. W.*); Scarborough !! (*T. W.*); York (*Stainton's Manual*).

Bucculatrix cidariella *Fisch.* Among alder.

Scarborough (*T. W.*); York ! (*Stainton's Manual*).

Bucculatrix ulmella *Mann.* Among oak.

Doncaster (*W. W.*); Scarborough (*T. W.*); York (*Stainton's Manual*).

Bucculatrix cratægifoliella *Dup.* Among hawthorn.

Doncaster !! (*W. W.*); Scarborough (*Stainton's Manual*); York (*Stainton's Manual*).

Bucculatrix Demaryella *Dup.* Among birch.

Scarborough (*T. W.*).

Bucculatrix Boyerella *Dup.* Larva feeds on elm.

York (*Stainton's Manual*).

Bucculatrix cristatella *Fisch.* Scarborough, common on yarrow (*T. W.*).

Nepticula atricapitella *Haw.* Larva lives in galleries in oak leaves.

Doncaster (*W. W.*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); York (*R. Hind, Ent. Mo. Mag.*, i. 217).

Nepticula ruficapitella *Haw.* Generally distributed and common. Occurs probably wherever *N. atricapitella* is found.

Doncaster !! (*W. W.*); Richmond !! (*J. Sang*).

Nepticula anomalella *Goe.* Among rose.

Doncaster (*W. W.*); Richmond !! (*J. Sang*); Scarborough !! (*T. W.*); York (*R. Hind, Ent. Mo. Mag.*, i. 217).

Nepticula perpygmæella *Dbl.* = pygmæella *Haw.* Among hawthorn.

Doncaster (*W. W.*); Harrogate !! (*J. Sang*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York (*W.P.*).

Nepticula pomella *Vaughan.* Richmond !! (*J. Sang*); Scarborough, on crab-apple (*T. W.*); York (*W.P.*).

Nepticula oxyacanthæcolella *Dbl.* Doncaster (*W. W.*); Richmond !(*J. Sang*); Scarborough !! (*Stainton's Manual*); York (*W.P.*).

Nepticula viscerella *Dougl.* Richmond, rare (*J. Sang*).

Nepticula catharticella *Stn.* Among *Rhamnus catharticus.*

Scarborough ! (*T. W.*); York (*Stainton's Manual*).

Nepticula septembrella *Stn.* Among *Hypericum.*

Edlington Wood near Doncaster (*W. W.*); Richmond! (*J. Sang*); Scarborough (*T. W.*).

Nepticula lapponicella *Wocke.* Larvæ feed in mines in birch leaves.

At Scarborough by Mr. T. Wilkinson (*E. Shuttleworth, Entom., June*, 1882, *p.* 126).

Nepticula cryptella *Frey.* Scarborough, among *Lotus corniculatus* (*T. W.*). Mr. Wilkinson used to take a spotted form of this species which he mistook for *N. Headleyella* Stainton.

Nepticula Weaverella *Dougl.* Scarborough, common about whortleberry (*T. W.*); Sheffield (*A.D.*).

Nepticula subbimaculella *Haw.* Among oak.

Doncaster (*W. W.*); Richmond !! (*J. Sang*); Scarborough (*T. W.*); Sheffield (*A.D.*); York (*R. Hind, Ent. Mo. Mag.*, i. 217).

Nepticula argyropezella *Zell.* Sheffield (*Zool.*, vii. 1649); Mr. T. Wilson found larvæ in aspen at York in 1879, from which he bred imagos the following year (*Ent. Mo. Mag.*, xvi. 211).

Nepticula trimaculella *Haw.* Balby near Doncaster (*W. W.*); Scarborough (*T. W.*); York (*Stainton's Manual*).

Nepticula floslactella *Haw.* Among hazel.

Doncaster (*W. W.*); Harrogate !! (*J. Sang*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); York (*R. Hind*).

Nepticula sorbiella *Stn.* First discovered as new to science by Mr. T. Wilkinson, in 1860: he bred it from mountain ash at Scarborough. Since then Mr. Sang has found it in abundance at Richmond.

Nepticula salicivorella *Dbl.*=**salicis** *Stn.* Among sallow.

Doncaster (*W. W.*); Harrogate !! (*J. Sang*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); York (*R. Hind*).

Nepticula myrtillella *Edl.* Among bilberry.

Blubberhouses (*Lord Walsingham*); Richmond !! (*J. Sang*); Scarborough !! (*T. W.*); Sheffield (*A.D.*).

Nepticula microtheriella *Wing.* Among hazel.
Doncaster !! (*W. W.*); Harrogate !! (*J. Sang*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York (*T. Wilson*).

Nepticula betulicolella *Stn.* Richmond ! (*J. Sang*); Sheffield (*A.D.*).

Nepticula ignobilella *Stn.* Among hawthorn.
Doncaster (*W. W.*); Scarborough (*T. W.*); York (*R. Hind*).

Nepticula aucupariella *Frey.* Richmond ! (*J. Sang*).

Nepticula argentipedella *Zell.* Doncaster (*W. W.*); Harrogate !! (*J. Sang*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough !! (*T. W.*); York (*Stainton's Manual*).

Nepticula plagicolella *Stn.* Doncaster (*W. W.*); Richmond (*J. Sang*); Scarborough !! (*J. Sang*).

Nepticula tityrella *Dougl.* Doncaster (*W. W.*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); York (*R. Hind*).

Nepticula malella *Stn.* Among wild apple.
Doncaster (*W. W.*); Scarborough (*R. Hind*).

Nepticula angulifasciella *Stn.* Among wild rose.
Doncaster (*W. W.*); Richmond !! (*J. Sang*); Scarborough ! (*T. W.*); York (*R. Hind*).

Nepticula atricolella *Stn.* Doncaster (*W. W.*); York (*R. Hind, Ent. Mo. Mag.*, i. 217).

Nepticula arcuosella *Frey.* Among strawberry.
Richmond (*J. Sang*); Scarborough !! (*T. W.*).

Nepticula gratiosella *Stn.* Huddersfield (*P.I.*); Scarborough (*T. W.*); York (*R. Hind, Ent. Mo. Mag.*, i. 217).

Nepticula marginecolella *Stn.* Doncaster (*W. W.*); Richmond (*J. Sang*); York (*R. Hind*).

Nepticula alnetella *Stn.* Among alder.

Harrogate (*J. Sang*); Scarborough (*T. W.*); York (*Stainton's Manual*).

Nepticula glutinosella *Stn.* First discovered as new to science by Mr. T. Wilkinson, who found the larvæ mining alder leaves at Scarborough, in the autumn of 1856, and from them bred imagos in 1857. Since then Mr. J. Sang has taken it at Harrogate, and Mr. P. Inchbald also records it from York.

Nepticula aurella *Fab.* Among bramble; a common species.

Doncaster (*W. W.*); Harrogate!! (*J. Sang*); Huddersfield (*P. I.*); Richmond !! (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A. D.*); York (*R. Hind*).

Nepticula luteella *Stn.* Among birch.

Doncaster (*W. W.*); Harrogate! (*J. Sang*); Richmond! (*J. Sang*); Scarborough (*T. W.*); York (*P. I.*).

Nepticula regiella *Frey.* Scarborough (*T. W.*); York (*Scientific Opinion*, 1869, ii. 36).

Trifurcula squamatella *Stn.* Scarborough (*T. W.*).

Trifurcula immundella *Zell.* Scarborough, common among broom (*T. W.*).

Trifurcula pulverosella *Stn.* Scarborough, common among wild apple (*T. W.*).

Bohemannia quadrimaculella *Bohem.* Scarborough, among alder in July (*T. W.*).

PTEROPHORI.

Agdistes Bennettii *Curt.* I was so surprised at finding this species in the list, sent me by Mr. John Sang of Darlington, of species taken by himself at Redcar, that I wrote to ask for further particulars. Mr. Sang replied as follows :—"I took an *Agdistes Bennettii* on the sandhills at Redcar, and have repeatedly looked for it since without success. *Statice limonium* does grow in the neighbourhood, but several miles from where I took the moth. I looked very closely for larvæ this summer (1881) without success, so it is quite a mystery how it got there."

Pterophorus dichrodactylus *Muhlig.* I took a specimen of this species from tansy in my own garden at Highroyd, Huddersfield, in August, 1876, which seems to be the only recorded occurrence in the south West Riding.

Scarborough, common among tansy (*T. W.*); York (*Stainton's Manual*).

Pterophorus Bertrami *Röss.* Larva feeds on *Achillea millefolium.*

Hexthorpe near Doncaster (*W. W.*); one at Staddlethorpe near Howden, by Mr. W. Prest, in 1877.

Pterophorus gonodactylus *Schiff.* = **trigonodactylus** *Haw.* Not uncommon among coltsfoot (*Tussilago farfara*).

Bishop's Wood (*W. P.*); Bramham (*J. Sm.*); Flamborough Head (*E. H.*); Goole, in Sandhill Wood (*John Harrison*); Hexthorpe near Doncaster !! (*W. W.*); Huddersfield (*G. T. P.*); Scarborough (*T. W.*); Sheffield (*A. D.*); York ! (*T. Wilson*).

Pterophorus acanthodactylus *Hüb.* The larvæ of this species seem to be generally found on *Ononis arvensis* and *Stachys sylvatica*, but I have taken the imago at Huddersfield on ling (*Calluna vulgaris*), where I believe neither of the two former plants grew within a considerable distance.

Edlington Wood (*G.T.P.*); Huddersfield (*G.T.P.*); Richmond (*J. Sang*); Scarborough (*Stainton's Manual*); York, common at Sandburn (*W.P.*).

Pterophorus parvidactylus *Haw.* Stainton's Manual gives Scarborough as a locality, but I do not know that I have ever seen a Yorkshire specimen.

Pterophorus phæodactylus *Hüb.* Hobkirk's 'History and Natural History of Huddersfield' gives this species as having been taken at that place, but I think this is most probably an error.

Pterophorus serotinus *Zell.* = **bipunctidactylus** *Haw.* Plentiful in old pastures, &c., where its foodplant (*Scabiosa*) grows freely. In some old rough fields adjoining Lepton Great Wood, Huddersfield, it occurs in great profusion, but within a radius of some miles round the town this is the only spot I know where it can be found. On this ground in 1882 I took it continuously on the wing from June 12th to October 14th, thus showing the imago to be out for over four months.

Bramham (*J.Sm.*); Edlington Wood ! (*G.T.P.*); Flamborough Head (*E.H.*); Grassington ! (*G.T.P.*); Huddersfield !! (*G.T.P.*); Redcar (*J. Sang*); Scarborough !! (*Stainton's Manual*); Sheffield (*A.D.*); York (*W.P.*).

Pterophorus plagiodactylus *Fisch.* Only recorded from Sandburn, York, by Mr. W. Prest, but I have no doubt it is often confused with the preceding species. I am quite satisfied myself indeed, and Mr. C. G. Barrett is of the same opinion, that it is merely a form, and a scarcely distinguishable form, of *P. bipunctidactylus*.

Pterophorus zophodactylus *Dup.*=**Loewii** *Zell.* Larvæ on flowers of *Erythræa* early in August.

Bramham (*J.Sm.*); Sandburn, York, in 1877, rare (*W.P.*).

Pterophorus pterodactylus *L.*=**fuscodactylus** *Haw.* The larva feeds on buds of *Veronica chamædrys.*

Boroughbridge (*W.P.*); Bramham (*J.Sm.*); Doncaster (*W. W.*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough (*Stainton's Manual*); Sheffield (*A.D.*); York !! (*W.P.*).

Pterophorus lithodactylus *Tr.* This species was first discovered as British at Doncaster, in 1844, by the Rev. G. Preston (*Zool.*, 1845, iii. 844 and 1006). The larva feeds on fleabane (*Inula dysenterica*).

Other localities are Flamborough Head (*E.H.*); Redcar !! (*J. Sang*); Scarborough !! (*T. W.*); York (*Stainton's Manual*).

Pterophorus monodactylus *L.*=**pterodactylus** *Hüb.* The larva feeds on convolvulus.

Doncaster (*W. W.*); Huddersfield (*G.T.P.*); Marsden Moors (*G.T.P.*); Scarborough (*Stainton's Manual*); York (*Stainton's Manual*).

Pterophorus tephradactylus *Hüb.* Larva feeds on golden rod (*Solidago virgaurea*).

Huddersfield (*P.I.*); Scarborough (*T. W.*); Sheffield (*A.D.*).

Pterophorus osteodactylus *Zell.* Also a golden-rod feeder.

Huddersfield (*S.L.M.*); Scarborough !! (*T. W.* and *G.T.P.*); Sheffield (*A.D.*).

Pterophorus microdactylus *Hüb.* Scarborough, plentiful among *Eupatorium cannabinum* (*T. W.*).

Pterophorus tetradactylus *L.* Larva on thyme.

Doncaster (*W. W.*); Richmond !! (*J. Sang*); Scarborough (*T. W.*); York (*Stainton's Manual*).

Pterophorus pentadactylus *L.* Widely distributed and generally common. The larva feeds on convolvulus.

Bramham (*J.Sm.*); Doncaster (*W.W.*); Goole (*J. Harrison*); Huddersfield (*G.T.P.*); Market Weighton (*W.P.*); Scarborough (*T.W.*); Selby (*K.R.*); Sheffield (*A.D.*); Wakefield !! (*G.T.P.*); York ! (*W.P.*).

ALUCITINA.

Alucita polydactyla *Hüb.* Larvæ feed in flowers of honeysuckle. Mr. W. Prest says the imago is often found hibernating in outhouses.

Bishop's Wood (*G.T.P.*); Bramham (*J.Sm.*); Doncaster (*W.W.*); Huddersfield (*P.I.*); Richmond !! (*J. Sang*); Scarborough (*T.W.*); Sheffield (*A.D.*); York ! (*W.P.*).

APPENDIX.

During and since the passage of the list through the press, six additional species and a number of fresh localities have come to hand. I give the former and a selection from the latter.

ADDITIONAL SPECIES.

Chesias obliquaria *W.V.* Whilst Mr. George Tindall was setting some captures rather late in the evening of June 14th, 1883, a fine fresh specimen flew into his house at Doncaster, through the open window (see the *Naturalist*, ix. 36).

Scoparia atomalis *Dbl.* This species was taken by Mr. E. P. P. Butterfield, at Blackhills, near Bingley, in July, 1883 (see *Nat.*, ix. 89). I fancy I have seen it repeatedly in the moorland districts of the West Riding, but I have always regarded the specimens as a small form of *S. ambigualis*, from which species there is indeed considerable doubt as to its distinctness.

Mixodia rubiginosana *H.S.* Mr. W. Prest informs me that he took a specimen of this rarity at Sandburn, York, in 1883.

Sciaphila perterana *Gn.* Taken by myself in July, 1883, near Beaumont Park, Huddersfield (*G.T.P.*). Also taken at Bingley (*E.P.P.B.*).

Tinea merdella *Zell.* This insect occurred in thousands in July, 1883, about a lot of wool which had lain for two years in my firm's warehouse in New Street, Huddersfield.

Gelechia gemmella *L.* This pretty species I found flying in abundance, in September, 1883, in the rough field adjoining Lepton Great Wood, Huddersfield.

ADDITIONAL LOCALITIES, &c.

Erebia Blandina. Taken at Buckden, in Upper Wharfedale, by Mr. Trevor Basil Woodd, through whose kindness I have seen specimens.

Chortobius Davus. The Thorne Moor specimens pertain to the var. **Rothliebii** *Staud.*

Larentia ruficinctata. Mr. Trevor Basil Woodd informs me that he has captured several specimens about Oughtershaw, in Upper Wharfedale, at an elevation of 1200 feet above sea level, and he kindly forwarded me specimens for examination.

Larentia olivata. Found commonly in Grass Wood, Upper Wharfedale, early in August (*E.P.P.B.*).

Coremia unidentaria. Threshfield, in Upper Wharfedale, August, 1883 (*E.P.P.B*).

Dicranura furcula. Larvæ common at Strensall, York (*W. Hewett*).

Miana expolita. Early in August Mr. E. P. P. Butterfield searched for and again took this species in Grass Wood, Upper Wharfedale.

Agrotis valligera. Fairly common at Sandburn, near York, this year (*R. Dutton, Entom., Sep.* 1883, *p.* 209).

Tethea subtusa. On June 2nd I found larvæ on the poplars in the Green Farm Wood, near Doncaster (*G.T.P.*).

Paraponyx stratiotalis. Found in abundance at Frizinghall, near Bradford (*J. W. C.*).

Scoparia conspicualis. Mr. E. P. P. Butterfield took a specimen in June, 1883, in Grass High Wood, Upper Wharfedale, which was named for him by Mr. Barrett. This confirms my surmise that I saw it in Aug. 1882, when the Y.N.U. visited Grass Wood (see *Nat., N.S.* viii.

p. 27). Mr. Butterfield also took a fine specimen at Wilsden, near Bingley, in 1883. It would thus seem as if the species were well distributed in the county.

Crambus pinetellus. Among the interesting fresh localities which this year 1883 has produced may be cited Doncaster for the present species. On the evening of Aug. 4th, Mr. George Tindall found it flying in great plenty in the Green Farm Wood. This is the wood alluded to at p. 2 by Mr. Warren, and where indeed, except when otherwise stated in the List, most of his Doncaster captures were made. Previously *C. pinetellus* had only been recorded from Sheffield in our county.

Penthina ochromelana. Found commonly at Wakefield, June 7th, 1883 (*G.T.P.*).

Penthina sauciana. On the 6th August I noticed it flying rather commonly on the bilberry hills at Otley Chevin (*G.T.P.*).

Cnephasia lepidana. Harden Moor, near Bingley (*J.W.C.* and *E.P.P.B.*).

Sphaleroptera ictericana. York (*T. Wilson*); Bingley (*J.W.C.* and *E.P.P.B.*).

Grapholitha geminana. Abundant, Harden Moor and Black Hills, near Bingley (*J.W.C.* and *E.P.P.B.*).

Pœdisca ophthalmicana. Shipley Glen (*J. Firth*).

Pœdisca semifuscana. Bingley (*E.P.P.B.*); Otley (*G.T.P.*).

Pœdisca sordidana. Bingley (*E.P.P.B.*).

Pamplusia monticolana. Common, Rombalds Moor, Harden Moor, and Black Hills, near Bingley, and at Ingleborough (*J.W.C.* and *E.P.P.B.*). Previously only reported from Scarborough.

Stigmonota coniferana. Bingley (*E.P.P.B.*).

Dicrorampha herbosana. Grass High Wood, 1883 (*J.A. Butterfield*). Also taken by him near Bingley !

Micropteryx unimaculella. Shipley Glen (*J. Firth*).

Plutella porrectella. Bingley (*E.P.P.B.* and *J.W.C.*).

Hypolepia sequella. Bingley (*E.P.P.B.*).

Gelechia desertella. Huddersfield (*G.T.P.*). New to the south West Riding.

Gelechia similella. Taken on Crosland Moor, near Huddersfield, in July, 1883 (*G.T.P.*).

Argyresthia Andereggiella. Bingley (*E.P.P.B.*). Previously only reported from Bramham.

Elachista megerlella. Bingley (*E.P.P.B.* and *J.W.C.*).

Since the table was printed at p. 5, the changes which have been made during the progress of the list—both by addition and by subtraction—render it advisable to reproduce it. The lists include 1341 known Yorkshire species out of the 2032 considered as British, as follows:

	Yorkshire.		British.
Diurni	48	out of	64
Nocturni	80	,,	112
Geometræ	207	,,	278
Drepanulæ	3	,,	6
Pseudo-Bombyces	19	,,	27
Noctuæ	224	,,	309
Deltoides...	8	,,	14
Aventiæ	1	,,	1
Pyralides...	47	,,	75
Crambites	39	,,	80
Tortrices...	203	,,	334
Tineina	443	,,	700
Pterophorina	18	,,	31
Alucitina	1	,,	1
Total	1341		2032

Several species included in the List are probably not really indigenous to the county. There can be no doubt, I think, that *Bombyx neustria*, although recorded from three localities, was in every case introduced from the South. The eggs being deposited in rings around the twigs of fruit and other trees, would thus be easily conveyed from Southern nurseries. *Sesia myopæformis* was probably taken to Sheffield in apple trees; and *Eupithecia sobrinata* to York on junipers in the same way; and possibly the presence of several other species in unlikely localities may be thus accounted for.

In conclusion, I must again express my thanks to Messrs. William Warren of Cambridge, and John Sang of Burton-on-Trent (formerly of Darlington) for the trouble and care they have taken in going over the proof sheets of the Tortrices and Tineæ; without their assistance several errors in these two orders would inevitably have crept in.

G. T. PORRITT.

HUDDERSFIELD,
December, 1883.

INDEX OF GENERA.

Doubleday's nomenclature is adopted in the foregoing list; but, with a view of rendering this Index more useful, the genera adopted in Stainton's Manual are inserted as synonyms, where they differ from those used by Doubleday.

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A LIST OF THE COLEOPTERA OF YORKSHIRE,

By the Rev. W. C. HEY, M.A.,

Vicar of St. Olave's, York; Vice-President of the Yorkshire Naturalists' Union; Honorary Curator in Entomology to the Yorkshire Philosophical Society.

It is with much diffidence that I have undertaken to write a list of the Coleoptera of this county, and I do so more from the consideration that everything must have a beginning, than because I can hope to produce anything at all complete. Some districts (as the records will show), have been thoroughly investigated by first-rate Coleopterists; others are almost unknown; and though it is not perhaps likely that a *very* large number of species will be added to the list now published (except in the case of the more obscure genera), there can be no doubt that localities, even for many of the scarcer species, will be largely multiplied. On the other hand, extended cultivation and extended building operations are hastening the extinction of not a few species included in the list, especially among the *Hydradephaga*.

In a county of such extent and of such varied character as Yorkshire, I thought it imperative to classify the records of captures under the heads of districts. However, not to make the list too lengthy, or (as some might think) needlessly elaborate, I have contented myself with adopting that simple division into five districts in accordance with which the excursions of the Yorkshire Naturalists' Union are arranged, viz:—

1. South East.—The Wolds and Holderness.
2. North East.—The Cleveland Hills and Upper Vale of Derwent; including also such portion of the Vale of Mowbray as lies east of the rivers Wiske and Swale.

3. NORTH WEST.—The hill-districts of the North and West Ridings as far south as Keighley and Rombald's Moors, and such portion of the Vale of Mowbray as lies west of the rivers Wiske and Swale.

4. CENTRAL.—The great central plain of the county or Vale of York; defined for convenience sake by the railway lines from Arthington to Boroughbridge, Malton, and Wharram Percy, on the east by the western escarpment of the Wolds, and on the south by the rivers Aire and Ouse.

5. SOUTH WEST.—The southern portion of the West Riding.

I have to tender my best thanks to Mr. Wm. Denison Roebuck for a vast amount of material, carefully and methodically amassed; to Mr. E. B. Wrigglesworth, for the use of a large number of MS. notes, invaluable for the south-western portion of the county; to Mr. Lawson, of Scarborough, for similar help in regard to the wonderfully rich entomological fauna of that neighbourhood; and to the Rev. W. W. Fowler for much useful assistance, especially in the identification of obscure species. In conclusion I have to crave the indulgence to which the difficulty of the work may perhaps give me some claim.

The initials of authorities have been used for the sake of brevity in the following cases:—

W.K.B.	...	W. K. Bissill.
W.W.F.	...	Rev. W. W. Fowler, M.A., F.L.S.
W.C.H.	...	Rev. W. C. Hey, M.A. (The Author).
R.L.	...	Robert Lawson.
W.D.R.	...	Wm. Denison Roebuck, F.L.S.
E.A.W.	...	E. A. Waterhouse.
E.B.W.	...	E. B. Wrigglesworth.

GEODEPHAGA.

CICINDELIDÆ.

Cicindela campestris L. The Tiger Beetle occurs in dry sandy places, both on sea shores and low-lying commons as well as on high moors. It is generally plentiful in suitable localities throughout the summer, but only appears on the wing in brilliant weather. Its wide distribution is illustrated by the fact that I have taken it on the Swiss Alps at 2500 ft., and on the scorched plains of Andalusia.

1. S.E.—No records.

2. N.E.—Guisborough Moors (*W.C.H.*); Hovingham (*Zool.*, 1871); Sneaton Moor, Sep. (*H. Crowther*, *Nat.*, *Jan.* 1879); Scarborough, on the sands (*R.L.*); Whitby (*M. Simpson*, *Whitby Lit. & Phil. Soc. 45th Report*); Skelton (*E.B. W.*).

3. N.W.—Pannal, abundant in Sandy Bank Quarry (*W.D.R.*); Ripon (*E.A. W.*); West End, Washburndale, April (*W. Eagle Clarke*).

4. CENTRAL.—Acomb (*MS. note in Curtis's Guide*); Buttercrambe Moor (*W.C.H.*); Strensall Common, June (*W.C.H.*); Haxby (*E.B. W.*).

5. S.W.—Adel Moor, common (*W.D.R.*); Meanwood Valley (*Rev. Jno. Hanson*); Norland Moor, April (*E. S. Cooper*, *Brighouse Nat. Soc.*); Heath, near Wakefield (*E.B. W.*).

CARABIDÆ.

CYCHRINA.

Cychrus rostratus L. This species appears to be only sparingly distributed in Yorkshire, though common enough near York, under stones in gardens and damp places.

1. S.E.—Brough, June (*E.B. W.*).

2. N.E.—Scarborough (*R.L.*).

3. N.W.—Studley (*E.A.W.*); Browsholme (*W.D.R.*); Gordale Scar, August (*W.C.H.*); Attermire Crags, May (*W.C.H.*); Semerdale, July (*W.D.R.*).

4. CENTRAL.—York, very frequent (*W.C.H.*).

5. S.W.—Halifax (*MS. List, R. Leyland ?*); Walton (*E.B.W.*).

CARABINA.

Carabus nitens L. Frequents heathy ground, both low commons and high moors. Pretty well distributed in Yorkshire, but not exactly plentiful.

2. N.E.—Crosscliff Moor (*R.L.*); Eston Nab (*Rev. G. T. Rudd*).

3. N.W.—Bingley Moor (*W.D.R.*); Richmond, May (*G. P. Harris*); Studley (*E.A.W.*); Rombald's Moor (*E.B.W.*).

4. CENTRAL.—Strensall Common (*T. W. Wilson, R. Cook &c.*).

5. S.W.—Greetland Moor (*E.B.W.*); Thorne Waste (*W.D.R.*).

Carabus granulatus L. In gardens under stones and by the sandy banks of rivers, &c. Probably much more common and general than the recorded captures seem to indicate.

1. S.E.—Brough (*E.B.W.*).

4. CENTRAL. — Very frequent at York in spring (*W.C.H.*); in flood refuse at Clifton in March (*W.C.H.*).

5. S.W.—Doncaster (*F. Holme, Zool.*, 1843); Fenay, near Huddersfield; Haw Park; Walton (*E.B.W.*).

Carabus monilis F. This species, which is perhaps the commonest *Carabus* in the Midlands, is only rather scarce in Yorkshire. I once saw many hundreds of this insect, dead or dying, at the bottom of a small hole in a sandpit at Oxford, into which they had fallen.

1. S.E.—Bridlington Quay, May (*W.C.H.*).

2. N.E.—Scarborough (*R.L.*).

3. N.W.—Harrogate, not uncommon (*G. Wailes*, *Steph. Illus.*, *June* 30, 1828, i. 178).

4. CENTRAL.—York, on footpaths, and once in a cellar (*W.C.H.*).

Carabus arvensis F. Only one record of the capture of this local species has come to hand, viz.,

4. CENTRAL.—Strensall Common (*T. W. Wilson*).

Carabus catenulatus Scop. Under stones, &c. Frequent.

2. N.E.—Sneaton Moor, Sep. (*H. Crowther*); Helmsley (*W. Hey*); Scarborough (*R.L.*).

3. N.W.—Pannal, Aug. and Sep. (*W.D.R.*); Ripon (*E.A.W.*); Richmond (*W.C.H.*).

4. CENTRAL.—Stockton, near York (*Old MS.*).

5. S.W.—Meanwood Valley, at sugar (*W.D.R.*); Mirfield (*Mr. Howgate*); Wakefield; Wentbridge; Walton (*E.B.W.*).

Carabus nemoralis Müll. Seems confined to the western half of the county. Though recorded as plentiful at Askham about 1830, it has not been taken there for many years.

3. N.W.—Pannal (*W.D.R.*); Studley (*E.A.W.*).

4. CENTRAL.—Askham Bryan, 'frequent in gardens and under moss at all times of the year' (*A. Wright*); Bishop Wood (*W. Raine*).

5. S.W.—Leeds, common (*W. H. Taylor*); Roundhay (*W. Raine*); Wakefield district, gardens, &c.; Hebden Bridge (*E.B.W.*).

Carabus glabratus Payk. Confined to the high mountains of the North-West. It was first discovered in England by Prof. Hooker, who took it plentifully on Ingleborough. See Donovan, 1811, xv. 3. Curtis says, 'After heavy rains I have observed *C. glabratus* on the mountains in Yorkshire emerge from their hiding places, and seize earthworms in their jaws, running off with them readily enough.' (Jno Curtis, Entom. Soc., Jan. 1. 1855. Zool., 1855).

3. N.W.—Ingleborough (*Prof. Hooker*); mountains in Yorkshire (*J. Curtis*).

Carabus violaceus L. Probably the commonest of the genus in Yorkshire. Occurs in damp spots about gardens, &c.

1. S.E.—Bridlington, July (*W.C.H.*); Bridlington, August (*W.W.F.*).

2. N.E.—Scarborough, Sep. (*W.C.H.*); Scarborough (*W.K.B.*).

3. N.W.—Studley (*E.A.W.*); Pannal (*W.D.R.*); Grinton in Swaledale, August (*W.D.R.*).

4. CENTRAL.—Gardens at York and flood refuse (*W.C.H.*).

5. S.W.—Leeds district, abundant (*W. H. Taylor*); Kirkstall Abbey (*W.D.R.*); Adel and Gipton Wood (*W. Raine*); Wakefield, abundantly distributed (*E.B.W.*); Wentbridge (*E.B.W.*); Thorne Waste (*W.D.R.*).

ELAPHRINA.

Elaphrus riparius L.

1. S.E.—Hornsea Mere, August (*W.K.B.*).

2. N.E.—Helmsley (*W.K.B.*); Marton-by-Tees (*L. Rudd*).

3. N.W.—Ripon (*E.A.W.*).

4. CENTRAL.—Askham Bog (*R. Cook*).

5. S.W.—Wakefield (*E.B.W.*).

Elaphrus cupreus Duft. Our commonest species. Sometimes very abundant at the sides of ponds.

1. S.E.—Brough (*E.B.W.*).

2. N.E.—Marton-by-Tees, very abundant (*L. Rudd*); Scarborough (*R.L.*).

4. CENTRAL.—Askham Bog in spring (*W.C.H.*); Kirkham Abbey, August (*W.C.H.*).

5. S.W.—Commondale Moor and Walton (*E.B.W.*).

Elaphrus lapponicus Gyll. Of this Alpine species, a single specimen was taken by R. Cook in Askham Bog, August

25th, 1842. It was a strange locality for it, but there seems no doubt about the correctness of the record.

4. CENTRAL.—Askham Bog (R. Cook).

Blethisa multipunctata L. Another of the Askham Bog rarities, but not taken for many years.

4. CENTRAL.—Askham (*A. Wright, Nov. 30th*, 1830, *Loudon's Mag. N. H.*, 1831); Askham (*R. Cook, May 16th*, 1836).

LORICERINA.

Loricera pilicornis F. Common and general.

1. S.E.—Bridlington Sands (*W.C.H.*).

2. N.E.—Scarborough (*W.K.B.*); Redcar, under seaweed, in profusion, Sep. (*W.C.H.*); Aislaby (*H. Pollard*).

3. N.W.—Studley (*E.A. W.*); Pannal (*W.D.R.*).

4. CENTRAL.—Strensall, May (*W.C.H.*); often in flood refuse at York (*W.C.H.*).

5. S.W.—Haw Park and Wakefield (*E.B. W.*); Rivelin Valley (*E.B. W.*).

NEBRIINA.

Notiophilus aquaticus L. Probably tolerably common and general.

2. N.E.—Redcar (*W. Hey*).

4. CENTRAL.—Strensall, June (*W.C.H.*); Sandburn, May (*W.C.H.*).

Notiophilus palustris Duft. This species appears to have been oftener observed than the former, though their close resemblance may have caused confusion.

2. N.E.—Scarborough (*W.K.B.* and *R.L.*); Danby (*H. Pollard*); Whitby (*E.B. W.*).

4. CENTRAL.—Haxby (*E.B. W.*).

5. S.W.—Wakefield (*E.B. W.*).

Notiophilus biguttatus F. Very common and general.

1. S.E.—Brough (*E.B. W.*).

2. N.E.—Scarborough (*W.K.B.* and *R.L.*); Marton, 'extremely abundant' (*L. Rudd*); Whitby (*H. Pollard*); Redcar (*W. Hey*).

3. N.W.—Ripon (*E.A. W.*).

4. CENTRAL.—York district generally (*W.C.H.*).

5. S.W. — Wakefield, 'very common' (*E.B. W.*); Sheffield (*E.B. W.*).

Notiophilus substriatus Wat.

4. CENTRAL.—Ouse flood refuse, February (*W.C.H.*).

5. S.W.—Leeds, named by E. C. Rye (*W.D.R.*); Wakefield (*E.B. W.*).

Leistus spinibarbis F. Not common.

1. S.E.—Bridlington, October (*W.C.H.*).

3. N.W.—Studley (*E.A. W.*).

4. CENTRAL.—York district (*W. Hey*).

5. S.W.—Wakefield district (*E.B. W.*).

Leistus fulvibarbis Dej. Plentiful and general.

1. S.E.—Brough (*E.B. W.*).

2. N.E.—Scarborough (*W.K.B.* and *R.L.*).

3. N.W.—Leyburn (*W.C.H.*).

4. CENTRAL.—York; Boroughbridge; Selby (*W.C.H.*).

5. S.W.—Wakefield; Walton (*E.B. W.*).

Leistus ferrugineus L. Local; sometimes very plentiful.

2. N.E.—Scarborough (*W.K.B.* and *R.L.*); Danby in Cleveland.

3. N.W.—Masham (*H. Pollard*).

4. CENTRAL.—York, autumn, in abundance in damp hedge-cleanings (*W.C.H.*).

5. S.W.—Stanley, near Wakefield (*E.B. W.*).

Leistus rufescens F. Another local species.

1. S.E.—Brough (*E.B. W.*).

2. N.E.—Scarborough (*W.K.B.*).

3. N.W.—Studley (*E.A. W.*); Masham (*H. Pollard*).

4. CENTRAL.—Askham Bog, Sep., in moss (*W.C.H.*).

5. S.W.—Wakefield (*E.B. W.*); Midgley Moor (*Dawson*).

Nebria livida F. This handsome insect is well known as the speciality of the Yorkshire coast. It was first discovered by Mr. Wm. Spence on the shores of the Humber, early in

the present century, but was not taken plentifully till many years after. Its favourite habitat is the lower part of the cliffs of boulder clay, where it may be taken abundantly under stones and in crevices. The earliest date at which I have taken the perfect insects is May 17th, but they were then very soft. The larvæ have been observed in Gristhorpe Bay in January.

1. S.E.—Abundant at Bridlington Quay (*W.C.H.*); near Hull (*W. Spence*); Hornsea (*W.K.B.*); Spurn (*W. E. Clarke*).

2. N.E. — Scarborough (*R.L.*); Whitby (*E.B. W.*); Redcar (*G. T. Rudd*); Gristhorpe Bay (*W.K.B.* and *W. Hey*).

[NOTE.—Owing to a very natural misapprehension of some remarks made by Mr. T. V. Wollaston (*vide* Zool., 1846), *N. complanata* has been considered a Yorkshire insect. I can meet with no evidence of its capture on this coast; indeed the evidence points the other way.]

Nebria brevicollis Fab. One of the most ubiquitous of insects, as the records prove.

1. S.E.—Bridlington, Flamborough, &c. (*W.C.H.*); Brough (*E.B. W.*).

2. N.E. — Scarborough (*R.L.*); Whitby (*E.B. W.*); Redcar (*W.C.H.*); Fylingdales (*W.C.H.*).

3. N.W. — Ilkley (*E.B. W.*); Studley (*E.A. W.*); Richmond (*W.C.H.*).

4. CENTRAL. — Everywhere round York; Strensall; Cattal; Selby (*W.C.H.*); Wetherby (*E.B. W.*).

5. S.W.—Doncaster; Wakefield (*E.B. W.*).

Nebria gyllenhalii Sch. A subalpine species, confined to the higher parts of the county.

2. N.E.—Helmsley, July (*W.K.B.*); Scarborough (*R.L.*).

3. N.W.—Studley (*E.A. W.*); Giggleswick (*W. Hey*).

5. S.W.—Midgley Moor, near Halifax (*Mr. Gibson, vide Steph. Ill.*, June 30th, 1828, i. 179); Hebden Bridge (*Steph. Man.*).

SCARITINA.

Dyschirius thoracicus Rossi. In Yorkshire the *Dyschirii* are confined to the sandy parts of the coast line.

1. S.E.—Cliffs south of Bridlington Quay, where there is loose sand (*W.C.H.*); ditto, 'very abundant' (*W. W.F.*).

2. N.E.—Redcar (*W. Hey*).

Dyschirius nitidus Dj. Stephens gives 'shores of the Humber' as a locality for this species, and the Rev. G. T. Rudd describes it as occurring 'in profusion at Redcar' (1829). Dawson is sceptical about it (*vide* Geod. Brit., p. 27), and I share his scepticism.

[**Dyschirius angustatus** Ahr. A series taken at Bridlington Quay by the Rev. W. W. Fowler was referred to this species provisionally, but is now considered a small variety of the succeeding species].

Dyschirius politus Dej.

1. S.E. — Near Bridlington (*Dawson, Geod. Brit.*). The *D. angustatus* (?) are almost certainly a small variety of this species, but some often have the denticulation of the anterior tibiæ marked.

Dyschirius salinus Schaum.

1. S.E.—Bridlington Quay, in company with *D. thoracicus*, May and July (*W.C.H.*); shores of the Humber (*Dawson, Geod. Brit.*).

Clivina fossor L. Common and general. It is sometimes very abundant in the Ouse flood-refuse.

2. N.E. — Whitby and Eskdale (*H. Pollard*); Scarborough (*R.L.*); Cleveland district (*H. Pollard*); Guisborough (*E.B. W.*).

3. N.W.—Studley (*E.A. W.*); Bolton Wood (*E.B. W.*).

4. CENTRAL.—York; Selby (*W.C.H.*).

5. S.W.—Wakefield; Wentbridge (*E.B. W.*).

Clivina collaris Herbst.

1. S.E.—Brough.

2. N.E.—Helmsley (*W.K.B.*); Scarborough (*R.L.*).

4. Central.—York district; Selby (*W.C.H.*).
5. S.W.—Wakefield; Wentbridge (*E.B. W.*).

HARPALINÆ.

PANAGÆINA.

Panagæus —— sp.? Mr. Lawson, of Scarborough, informs me that he took one of the Panagæi on one occasion in the flood refuse of Scalby Beck. As he has parted with the specimen, it is impossible to determine the species.

BEMBIDIINA.

Tachypus flavipes L. Not uncommon.

1. S.E.—Bridlington Quay (*W.C.H.*).
4. Central.—York; Selby; Fulford (*W.C.H.*).
5. S.W.—Wakefield district and Wentbridge (*E. W.B.*).

Bembidium rufescens Guér.

2. N.E.—Scarborough (*R.L.* and *W.K.B.*).
3. N.W.—Studley (*E.A. W.*).
4. Central.—Askham, 1830 (*A. Wright, in Loudon's Mag. N.H.*, 1831).

Bembidium quinquestriatum Gyll.

3. N.W.—Studley (*E.A. W.*).

Bembidium obtusum Sturm.

2. N.E.—Whitby (*E.B. W.*).
3. N.W.—Studley (*E.A. W.*).
4. Central.—Selby (*W.C.H.*).

Bembidium biguttatum F. Common and general.

1. S.E.—Brough (*E.B. W.*).
2. N.E.—Scarborough (*R.L.*).
3. N.W.—Studley (*E.A. W.*); Leyburn (*W.C.H.*).
4. Central.—York district (*W.C.H.*).
5. S.W.—Horbury and Wakefield (*E.B. W.*).

Bembidium æneum Germ.

1. S.E.—Hornsea, sand hills and cliff (*W.K.B.*); shores of the Humber (*Dawson, Geod. Brit.*).

2. N.E.—Scarborough (*W.K.B.*); Whitby, Sep. (*H. Crowther*).

4. CENTRAL. — Pontefract (*H. Crowther*); Haxby (*E.B.W.*).

5. S.W.—Wakefield (*E.B.W.*).

Bembidium guttula F.

2. N.E.—Scarborough, Jan. and Feb. (*W.K.B.*).

3. N.W.—Studley (*E.A.W.*).

4. CENTRAL.—York, in flood refuse, Jan. (*W.C.H.*).

5. S.W.—Newton near Wakefield (*E.B.W.*).

Bembidium assimile Gyll.

1. S.E.—Hornsea, at the Mere, July 1859 (*W.K.B.*).

Bembidium quadrimaculatum L. Doubtless more general than the records indicate.

2. N.E.—Scarborough (*R.L.*).

4. CENTRAL.—York district, common (*W.C.H.*); Pontefract (*E.B.W.*).

Bembidium quadriguttatum F.

1. S.E.—Bridlington, August (*W.W.F.*).

2. N.E.—Filey, August (*W.W.F.*).

5. S.W.—Wakefield (*E.B.W.*).

Bembidium minimum F. Only a single capture is recorded for this insect.

2. N.E.—Eston in Cleveland (*W. Hey*).

Bembidium gilvipes Sturm. No doubt tolerably common.

1. S.E.—Withernsea (*W.K.B.*).

4. CENTRAL.—York district, abundantly (*W.C.H.*).

Bembidium lampros Herbst. Common and general.

1. S.E.—Bridlington (*W.W.F.*).

2. N.E.—Scarborough (*R.L.* and *W.K.B.*); Helmsley (*W.K.B.*); Filey (*W.W.F.*).

3. N.W.—Studley (*E.A.W.*).

4. CENTRAL. — Fulford; Strensall, &c., abundant (*W.C.H.*).

5. S.W.—Wentbridge ; Fenay ; Wakefield (*E.B.W.*) ; Midgley Moor (*Steph. Man.*).

Bembidium decorum Panz. No recent records exist of the capture of this species, but it is reported from Midgley Moor on the authority of Mr. Gibson in 1828 (*vide* Steph. Ill., July 1, 1828, ii. 15). It is also said to occur near the Ouse (T. J. Bold ; *vide* Zool. 1846, iv. 1237).

Bembidium monticola Sturm.

2. N.E.—Helmsley and Scarborough (*W.K.B.*).

3. N.W.—Studley (*E.A.W.*).

Bembidium stephensi Crotch.

1. S.E.—Bridlington, August (*W.W.F.*) ; Withernsea, July (*W.K.B.*).

2. N.E.—Marton in Cleveland (*Rev. G. T. Rudd* ; see also *Dawson's Geod. Brit.*, p. 191).

Bembidium brunnipes Sturm. Common and general.

1. S.E.—Hornsea (*E.B.W.*) ; Bridlington (*W.W.F.*) ; Brough (*E.B.W.*)

2. N.E. — Scarborough (*R.L.*) ; Filey (*W.W.F.*) ; Whitby (*E.B.W.*).

3. N.W.—Studley (*E.A.W.*) ; Crina Bottom, Ingleborough (*W.D.R.*).

4. Central.—York district (*W.C.H.*).

5. S.W.—Wakefield ; Hebden Bridge (*E.B.W.*).

Bembidium tibiale Dufts. Local, and not plentiful.

1. S.E.—Hornsea, July 1859 (*W.K.B.*) ; Bridlington, Aug. 1878 (*W.W.F.*).

2. N.E.—Scarborough (*W.K.B.*).

3 N.W.—Studley (*E.A.W.*).

Bembidium atrocæruleum Steph. In Stephens' Ill., July 1, 1828, ii. 17, the author states he has two specimens of this insect taken near Halifax by Mr. Gibson.

Bembidium saxatile Gyll.

1. S.E.—Bridlington, Aug. 1878 (*W.W.F.*).

2. N.E.—Scarborough, Jan. 1859 (*W.K.B.*).

Bembidium femoratum Sturm. Tolerably common and general.

2. N.E.—Scarborough (*W.K.B.* and *R.L.*).

3. N.W.—Studley (*E.A.W.*).

4. CENTRAL.—Strensall, &c. (*W.C.H.*).

Bembidium anglicanum Sharp.

2. N.E.—Banks of the Tees, 1835 (*G. T. Rudd; vide Entom. Monthly Magazine*, 1869, vi. 133).

Bembidium bruxellense Wesm. This species appears to have been only taken at Scarborough.

2. N.E.—Scarborough, July 1858, Jan. 1859 (*W.K.B.*).

Bembidium concinnum Steph.

1. S.E. — Withernsea (*W.K.B.*); Hornsea, June (*E.B.W.*); Brough (*E.B.W.*).

2. N.E.—Scarborough (*W.K.B.*).

3. N.W.—Crina Bottom, Ingleborough (*W.D.R.*).

Bembidium littorale Ol. Very common and general.

1. S.E.—Hornsea (*W.K.B.*); Bridlington (*W.C.H.*).

2. N.E.—Scarborough (*W.K.B.* and *W.C.H.*).

3. N.W.—Studley (*E.A.W.*); Richmond (*W.C.H.*); Blubberhouses (*W. E. Clarke*).

4. CENTRAL.—York district, everywhere (*W.C.H.*).

[NOTE.—Mr. Bissill took on the coast a variety 'smaller, narrower, and with the spots much more widely separated and conspicuous than the type.'

Bembidium lunatum Duft. Scarce and local.

1. S.E.—Bridlington, Aug. 1878, one spec. (*W.W.F.*); shores of the Humber (*Dawson*).

Bembidium flammulatum Ol.

2. N.E.—Scarborough (*R.L.*).

4. CENTRAL.—York (*W.C.H.*).

5. S.W.—Walton and Woolley Edge, near Wakefield (*E.B.W.*).

Bembidium varium Ol. Only one record of the capture of this insect in Yorkshire seems known, viz.,

1. S.E.—Spurn Point, June (*W. Hey*).

Bembidium obliquum Sturm. Equally scarce.

1. S.E.—Hornsea, July, 1859 (*W.K.B.*).

Bembidium prasinum Duft.

2. N.E.—Helmsley, 50 specimens, July, 1858 (*W.K.B.*).

Bembidium punctulatum Drap.

3. N.W.—Studley (*E.A. W.*).

Bembidium paludosum Panz.

2. N.E.—Banks of the Rye near Helmsley, in profusion, in autumn (*Rev. A. Matthews*); Tees banks (*G. T. Rudd*).

3. N.W.—Studley (*E.A. W.*).

5. S.W.—Sheffield (*Dawson*, *Geod. Brit.*, and *Rev. F. W. Hope*).

POGONINA.

Patrobus excavatus Payk. Frequent and general.

2. N.E.—Scarborough (*W.K.B.*).

3. N.W.—Studley (*E.A. W.*).

4. Central. — Strensall and York district generally, very abundant (*W.C.H.*); Pilmoor (*W.C.H.*).

5. S.W.—Wakefield district (*E.B. W.*).

Patrobus septentrionis Dej. 'This is an Alpine species, but I have taken it near Wakefield' (*E.B. W.*, *ms.*, 1879).

Trechus discus F. Local.

1. S.E.—Hornsea (*W.K.B.*).

2. N.E.—Helmsley (*W.K.B.*); Scarborough (*R.L.*).

3. N.W.—Studley (*E.A. W.*).

4. Central.—Pontefract (*E.B. W.*).

5. S.W.—Wakefield (*E.B. W.*).

Trechus micros Herbst. Another local species, confined apparently to the northern half of the county.

2. N.E.—Helmsley, one specimen (*W.K.B.*); Scalby Beck, July (*W. Hey*).

3. N.W.—Leyburn, river bank, June (*W.C.H.*).

Trechus rubens F. Local and scarce.

1. S.E.—Hull (*W. Spence*, see *Steph. Ill.*, June 30, 1828, i. 172, and *Steph. Man.*, 1839, p. 50).

3. N.W.—Studley (*E.A. W.*).

Trechus minutus F. Common and general.

2. N.E.—Scarborough (*W.K.B.*).

3. N.W.—Studley (*E.A. W.*).

4. CENTRAL.—York district (*W.C.H.*).

5. S.W.—Hebden Bridge (*E.B. W.*).

Trechus obtusus Er. Not scarce in some districts.

3. N.W.—Studley, 'more common than *T. minutus*' (*E.A. W.*); Leyburn, May (*W.C.H.*).

4. CENTRAL.—Strensall and elsewhere round York (*W.C.H.*).

Trechus secalis Payk. Pretty plentiful.

1. S.E.—Shores of the Humber (*W. Spence* and *Steph. Man.*).

2. N.E.—Helmsley (*W.K.B.*).

3. N.W.—Studley (*E.A. W.*).

4. CENTRAL.—York district (*W.C.H.*).

5. S.W.—Wakefield district (*E.B. W.*).

PTEROSTICHINA.

Pterostichus cupreus L. Very abundant in sunny weather in spring.

1. S.E.—Brough and Market Weighton district (*E.B. W.*).

2. N.E.—Scarborough (*R.L.*).

3. N.W.—Studley (*E.A. W.*).

4. CENTRAL.—York district in abundance (*W.C.H.*); Wetherby (*Nat., June* 1877).

5. S.W.—Wakefield and Wentbridge (*E.B. W.*).

Pterostichus picimanus Duft.—Very local.

2. N.E.—Scarborough (*R.L.*); banks of the Tees (*L. Rudd; vide Steph. Man.*, 1839, p. 35).

4. CENTRAL.—Askham (*A. Wright*, in *Loudon's Mag. Nat. Hist.*, 1831, iv., 165).

Pterostichus vernalis Pz. No doubt commoner than the records indicate.

4. CENTRAL.—York district (*W.C.H.*).

5. S.W.—Wakefield district (*E.B. W.*).

It is to a Yorkshireman that we are indebted for the first separate monograph on the British ferns. This was James Bolton, of Halifax, who published in 1785 the first volume of his 'Filices Britannicæ,' a quarto volume, containing copper-plates and full descriptions of 31 species. A second volume containing plates and descriptions of fifteen additional species appeared in 1790. He was the author also of a 'History of the Fungi growing about Halifax,' published in three volumes quarto in 1788 and 1789, with large plates in which 138 of the Agarics or other large Hymenomycetes are faithfully drawn. Teesdale, as I have already indicated, worked at the Cryptogamia, Dalton and Brunton specially at the Mosses, and Harriman and Robertson collected energetically the Teesdale lichens.

And now I must conclude. I need not attempt to draw any general moral from my story. The lesson which the biography of men of science should teach is just the same as that of any other men who have left their mark upon the world, a desire to emulate their diligence and their good qualities. If we had in Yorkshire a botanical art-gallery like that which Miss North has lately so liberally given to the nation at Kew, we should be able to decorate a good many of the buttresses with the memorial-plants of natives of the county who have distinguished themselves in botany. Without going beyond the end of the eighteenth century there are upwards of a dozen, and my wish is that our young members, when they look through their London catalogues and colonial floras, should have some definite association of ideas to attach to the names of Johnsonia, Listera, Tofieldia, Salisburia, Fothergillia, Teesdalia, Lawsonia, and the others, and whilst 'the old order changes giving place to new, lest one good custom should corrupt the world,' it is fitting that we, in our meetings such as this, should sometimes turn aside from the work of to-day to thankfully remember and acknowledge what our early predecessors have done for us.

YORKSHIRE NATURALISTS' UNION.

BOTANICAL SECTION.

The Sixth Annual Meeting was held at Selby, on the 3rd of March, 1883, the Chair being occupied by the President of the Union, Mr. J. G. Baker, F.R.S. No reports appear to have been presented. The following were elected officers for the year 1883 :—

President: THOMAS HICK, B.A., B.Sc., Harrogate, (re-elected).

Secretary for Phanerogamic Botany: P. F. LEE, Dewsbury.

Secretary for Cryptogamic Botany: GEORGE E. MASSEE, Scarborough, (re-elected).

The Seventh Annual Meeting was held at Barnsley, on the 4th of March, 1884, the chair being occupied by the President of the Union, Mr. J. G. Baker, F.R.S. The officers for 1883 were all re-elected for 1884. No reports appear to have been presented.

The Eighth Annual Meeting was held at Doncaster, on the 3rd of March, 1885, the chair being occupied by the Rev. William Fowler, M.A.

The Report on Phanerogamic Botany for the Years 1883 and 1884 [as printed at pp. 203—206] was read by Mr. Lee, and unanimously adopted on the motion of Mr. M. B. Slater (of Malton), seconded by Mr. J. A. Erskine-Stuart (of Batley). No Cryptogamic Report was submitted.

The officers were again re-elected as follows :—

President: THOMAS HICK, B.A., B.Sc., Harrogate.

Secretary for Phanerogamic Botany: P. F. LEE, Dewsbury.

Secretary for Cryptogamic Botany: GEORGE E. MASSEE, Scarborough.

REPORT ON YORKSHIRE BOTANY FOR 1883 AND 1884.

PHANEROGAMIA.

By P. FOX LEE,
Dewsbury; Phanerogamic Secretary to the Botanical Section.

1883.

The first meeting of the Yorkshire Naturalists' Union for 1883 was held at Doncaster on Whit-Monday, the 14th May. It was too early then, as the botanical paragraph of the circular announcing that meeting stated, for even the leaf-tufts of *Stratiotes aloides* to float up from the muddy bottoms of the drains at Potteric Carrs, but in August I found an abundance of it there in fine bloom. Also on the same date at the Carrs, an hitherto unpublished station within the County of York, I got specimens of what Mr. F. Arnold Lees believes to be *Ranunculus godronii* Gren., and so stated in the New Locality List of the Botanical Record Club's Report for the year 1883. The total number of Phanerogams, Ferns, &c., of the London Catalogue observed in the district was 177.

At the second meeting on June 11th, at Filey, only 34 species were noted, and these mostly the common coast plants, although a somewhat notable plant for this locality, viz., *Geranium sanguineum* L., was gathered near Speeton.

The third meeting was at York on the 14th July, and Strensall Common the hunting-ground. Very fine specimens of *Botrychium lunaria* Sw. were gathered on the railway side near Strensall village, and in one of the ditches occurred *Scutellaria minor* L. Of the latter I sent specimens to the Botanical Record Club, whose report for 1883 states that Strensall Common is 'a new station' for the Lesser Skull-cap, not

mentioned in Baker's 'North Yorkshire.' Another good plant, *Cnicus pratensis* Willd. was also found on the Common. Altogether 276 species were marked on the London Catalogue, indicating the day's work.

The next meeting was in picturesque Washburndale, on Bank Holiday, August 6th. Some five or six weeks before this date I had made the discovery on Poole Bridge of the Scaly Spleenwort, *Asplenium ceterach* L., and took some of the botanical members at this excursion to see it growing. I reported the locality and sent specimens to Mr. F. Arnold Lees for the Botanical Record Club, who says in the 1883 Report, this fern is 'not truly wild here, . . on Poole Bridge it has appeared within the last five years.' Of course this may be correct, yet the fairly large plants wedged fast in the mortar joints in an almost inaccessible part of the bridge, leads me to infer that it must have been well established for more than five years. The total number of observations from Poole, Washburndale to the margin of Nab Wood, and back to Otley was 256.

The fifth and last meeting for 1883, on the 1st September, in the region round about Malham, proved to be one of great interest. It is not every day that such a choice and well-worked district as Malham adds a new locality in the county for a good plant variety, but it was so at this ramble in the discovery at the Tarn Bog of *Serratula tinctoria* var. *monticola* Boreau. The find was afterwards confirmed by the then President, Mr. J. Gilbert Baker, F.R.S., and it also appears in the 1883 Report of the Botanical Record Club. Another interesting feature witnessed at the Tarn Bog was the successful cultivation of *Drosera anglica* Huds., planted in 1882. During the June of 1883 I found on Gordale Scar a montane form of *Myosotis sylvatica* Hoffm., and hoped it would turn out to be the rarer sub-species, *M. alpestris* Schmidt, of *M. sylvatica*. Unfortunately the leaves were not subsessile enough, and the calyx was loaded with hooked hairs. The third edition of Hooker's 'Students' Flora' says *M. sylvatica* ascends to 1,200 ft. in Yorkshire, so

the gathering must be dismissed as but a mountain form of that species. Many of the rarities of Malham were collected, and the total reached 291, making a grand total for 1883 of 1034.

1884.

The first meeting for 1884 was held at Roche Abbey on the 8th of May. The woods at the Abbey, Sandbeck Park, Maltby Woods and Common, and Martin Beck were investigated, and 117 of the earlier flowering plants were noticed. *Primula elatior* Jacq., was reported as occurring at Roche Abbey, but the meeting decided that the plant in question was not the true Oxlip of the south-eastern counties, but only the cowslip-primrose hybrid—the *P. variabilis* of Goupil, and the *P. vulgaris* var. c. *intermedia* of the Lond. Cat. The *Fritillaria meleagris* L., found in Sandbeck Park, too, is not accepted by the late H. C. Watson as being anything but undoubtedly introduced in England *north* of Staffordshire and Warwickshire.

The Whit-Monday meeting, on June 2nd, was held at Sherburn, and this good magnesian limestone district was pretty well worked by various parties. Three of the plants reported at this meeting, also mentioned in the 'Naturalist' for July, as having been observed during the day, were afterwards found to be incorrect. These plants were *Sium latifolium*, *Antirrhinum orontium*, and *Cephalanthera ensifolia*. Two beautiful specimens of *C. ensifolia* were certainly laid on the table, but it was subsequently made out they had been gathered in the Boston Spa district. On the banks of the stream near Bishop's Wood, a new locality was discovered for *Barbarea vulgaris*, sub-sp. *B. stricta* Andrz. The total number of Phanerogams with the higher Cryptogams of the London Catalogue was 266.

The next excursion was the Hawes one, on June 28th, and many rare plants were bagged. Mr. F. Arnold Lees' recent find of the very rare *Viola arenaria* DC., at Mossdale Head

Falls, was exhibited at the meeting, as also was Mr. J. Percival's new addition to the flora of Higher Yoredale, viz., *Melampyrum sylvaticum*, gathered at Whitfell Gill during the day. 238 was the total number of species observed.

The fourth meeting on Bank-Holiday Monday, August 4th, at Helmsley, brought 257 species under notice, including several good plants.

The Spurn excursion on the 3rd September, the last one for 1884, and considering the very limited time it afforded for working that strip of coast-line, proved of great value in the addition it made to our previous knowledge of plant distribution. No fewer than twelve species new to vice-county No. 61 of the late H. C. Watson's 'Topographical Botany,' were collected, specimens of which I have sent to the Botanical Record Club.

The new records are :—

Erodium moschatum L'Hérit.

Rosa rubiginosa L.

Artemisia maritima L.

Cuscuta trifolii Bab. A form only of *C. epthymum* Murr., which, according to Hooker, does not seem entitled even to sub-specific rank, being so similar to the type, and parasitic on other plants besides those of the clover family. This one was on *Lotus corniculatus* and creeping over *Galium verum*.

Hippophae rhamnoides L.

Atriplex littoralis L. and its variety

A. marina L.

Salicornia herbacea L.

Suæda maritima Dumort.

Chlora perfoliata L.

Convolvulus soldanella L. and

Carex arenaria L.

The total number of observations at the Spurn was 52, making 930 for the whole year.

YORKSHIRE NATURALISTS' UNION.

FUNGUS FORAY, SEP. 30 AND OCT. 1, 1881.

The first fungus foray of the Yorkshire Naturalists' Union was held in the year 1881, when the Union was honoured by the presence of Messrs. Wm. Phillips, F.L.S., of Shrewsbury, C. B. Plowright, F.L.S., of King's Lynn, and the Rev. J. E. Vize, M.A., of Forden Vicarage, Montgomeryshire; and also had the benefit of the assistance of one of their own members, Mr. George Massee, of Scarborough.

Mr. Vize arrived in Yorkshire on Tuesday, the 27th September, and stayed with the Rev. W. Fowler, of Liversedge. On the Wednesday, they, along with Messrs. James Abbott, J. J. Hummel, and others, explored the woods south of Micklefield, and in Ledstone Park, and found many species, attention being then given to the microscopic forms, on which Mr. Vize is so well known as an authority. The species found included—

Torula sporendonema
T. pulveracea
Sphæria pulvis-pyrius
Tubercularia vulgaris
Peronospora ranunculi
Trichia nubiformis
T. chrysosperma
Erysiphe martii
Peziza calycina
P. coronata
P. scutellata
P. virginia
P. cinerea
Pilobolus crystallinus
Clavaria coralloides
C. fusiformis
Rhytisma acerinum
Xylaria hypoxylon
Bulgaria sarcoides
Polyactis cana
Diatrype verruciformis
Thelephora laciniata
Amanita muscaria

and other commoner kinds of fleshy agarics. On the Thursday, about mid-day, Messrs. Phillips and Plowright arrived in Leeds, and in company with Messrs. Vize and Roebuck, proceeded to Meanwood, for a preliminary foray, and noted about thirty species, including *Peziza badia*. The main excursions were planned for Friday, the 30th, the localities selected being Harrogate for one party, and Studley Royal for another.

Messrs. Phillips and Massee headed the Harrogate party, and Mr. Thomas Hick, B.A., B.Sc., acted as leader, the party also including Messrs. Abbott, Soppitt, and Lister. The route taken was towards Beckwithshaw, the woods on both sides of the road being worked. *Lactarius uvidus* was found in fair quantity, as well as the more common *L. glyciosmus*. The odour of the latter was a subject of debate, as to what it could be compared, cocoa-nut being suggested by Mr. Hick. Nothing is more difficult than to define, accurately and tersely, the odours of many of the larger fungi; and to cite an example, Berkeley and Broome say that their *Agaricus ameides* has "a peculiar smell, resembling a mixture of orange-flower water and starch." So that it was not considered a far-fetched idea to liken that of *L. glyciosmus* to a mixture of cocoa-nut and treacle, with a suggestion of cinnamon. During the day, at Beckwithshaw, the beautiful *Agaricus rosellus* was found, also *Hypomyces rosellus*, a quantity of the edible *Helvella crispa*, and, close to Harrogate, *Peziza aurantia*, as well as sixty more species of more or less interest.

The Ripon party was headed by Mr. Plowright and Mr. Vize, and guided by the Rev. H. H. Slater, B.A., F.Z.S., through the woods and grounds of Studley Royal. The numerous interesting species found included *Agaricus (Tricholoma) pancæolus*, a species which was found for the first time in Britain, in 1875, at Street, in Somerset, next a few weeks ago, in Norfolk, and now in Yorkshire. The Rev. Mr. Summerfield soon lighted upon a magnificent specimen of another species, *A. (Lepiota) bucknalii*, which had only previously been found by Mr. Bucknall at Clifton, and shortly afterwards upon *A. pisciodorus* and *Geaster fimbriatus*, while Mr. Alfred Denny found *Agaricus dryimus* upon an oak tree. *Hygrophorus puniceus*, *H. fornicatus*, *H. cossus*, *H. unguinosus*, *Agaricus seminudus*, *Marasmius erythropus*, *Polyporus giganteus*, and *P. cæsius*, as well as about 120 other species were also collected.

On Saturday a 'show' was held, for which numerous consignments of fungi had been sent in from all parts of Yorkshire, and in the evening a fungus dinner, at which several species were cooked with great success. It is upon the materials accumulated in this manner that the list of fungi which follows has been based.

LIST OF YORKSHIRE FUNGI COLLECTED IN 1881.

By GEORGE MASSEE, F.R.M.S.,
Cryptogamic Secretary to the Botanical Section of the Yorkshire Naturalists' Union.

Fungi, until quite recently, or even at the present day, have fewer students and admirers than any other section of the vegetable kingdom. The large fleshy forms often resist drying, or retain but little of their original appearance, and hence offer no attractions to the body of 'naturalists,' whose energy is mostly expended in the formation of a collection. The literature, with the exception of books appertaining to names and synonyms, is scattered; the plants themselves are with us in numbers only for a comparatively short period of the year; and such probably are amongst the reasons for the paucity of students. The modern tendency of botanical teaching, which accords the place of honour to researches after the 'why and wherefore' instead of the 'name,' has brought into prominence certain members of the group under consideration; indeed, from a biological standpoint, the study of fungi cannot be ignored by any one desirous of becoming acquainted with the various processes of life.

In the year 1788, Bolton commenced the work entitled, 'Funguses about Halifax,' which yet—so far as pictures are of value—is useful. There are in Yorkshire probably as many funguses as flowering plants, and the following list—which includes only those species met with during the foray, or sent from various parts of the county to the meeting, and those observed at the Church Fenton ramble—is a first attempt to record, in accordance with the present state of knowledge, the Fungus Flora of Yorkshire.

Many fungi being confessedly difficult to determine with certainty, the utter worthlessness of many kinds when dried, and their generally ephemeral nature, are the principal reasons

for the necessity of the now popular 'Fungus Foray,' which enables the aspiring student to become thoroughly acquainted with, at least, the most generally occurring forms in his own district—a point of primary importance. Again, the value of the whole proceeding depends entirely on the presence of acknowledged authorities on the subject. Thus the success of the first fungus foray in connection with the Yorkshire Naturalists' Union, which added above fifty species to the county record, in addition to removing the uncertainty attending many more species, was due to the presence of Messrs. W. Phillips, C. B. Plowright, and the Rev. J. E. Vize, whose assistance and encouragement will, it is hoped, be acknowledged by increased researches on the part of Yorkshire mycologists.

[Those marked with an asterisk (*) were exhibited at the show.]

HYMENOMYCETES.

AGARICINI.

* **Agaricus (Amanita) muscarius** L. Beckwithshaw, Ledstone Park, Horsforth (*J. Abbott*); Micklefield (*J. J. Hummell*); Scarborough (*G. Massee*); Camblesforth (*W. N. Cheesman*).

* **Agaricus (Amanita) pantherinus** Fr. Harrogate excursion; Scarborough (*G. Massee*). Rare.

* **Agaricus (Amanita) rubescens** Fr. Harrogate excursion; Horsforth and Saltaire (*W. West*); Selby (*W. N. Cheesman*).

* **Agaricus (Amanita) vaginatus** Fr. Scarborough (*G. Massee*); Saltaire (*H. T. Soppitt*).

* **Agaricus (Lepiota) friesii** Lasch. Rare. West Riding.

Agaricus (Lepiota) procerus Scop. Selby (*W. N. Cheesman*).

* **Agaricus (Lepiota) cristatus** A. & S. Studley Royal excursion.

* **Agaricus (Lepiota) carcharias** P. Scarborough (*G. Massee*); Harrogate excursion. Rare.

Agaricus (Lepiota) granulosus Batsch. Harrogate excursion ; Studley Royal excursion.

* Agaricus (Lepiota) bucknalli B. & Br. Studley Royal excursion. Very rare ; only occurred once before in Britain.

Agaricus (Lepiota) seminudus Lasch. Studley Royal excursion.

* Agaricus (Armillaria) melleus Fl. Dan. Studley Royal excursion ; Meanwood, Allerton, Birstal, Bingley, Saltaire, Shipley (*W. West*) ; Harewood (*J. Abbott*) ; Selby (*W. N. Cheesman*) ; Scarborough (*G. Massee*). Very common in woods.

* Agaricus (Tricholoma) flavo-brunneus Fr. Scarborough (*G. Massee*).

* Agaricus (Tricholoma) rutilans Schæff. Harrogate excursion.

* Agaricus (Tricholoma) terreus Schæff. Studley Royal excursion ; Harrogate excursion.

* Agaricus (Tricholoma) saponaceus Fr. Studley Royal excursion.

* Agaricus (Tricholoma) personatus Fr.

* Agaricus (Tricholoma) nudus Bull. Studley Royal excursion.

* Agaricus (Tricholoma) panæolus Fr. Studley Royal excursion. Rare.

* Agaricus (Clitocybe) nebularis Fr. Meanwood wood.

* Agaricus (Clitocybe) clavipes P.

* Agaricus (Clitocybe) phyllophilus Fr. Meanwood wood ; Bingley (*W. West*).

Agaricus (Clitocybe) candicans P. Birstal, Horsforth, Allerton (*W. West*).

* Agaricus (Clitocybe) fumosus P. Studley Royal excursion.

* Agaricus (Clitocybe) giganteus Sow.

* Agaricus (Clitocybe) infundibuliformis Schæff. Studley Royal excursion ; Allerton, near Bradford (*W. West*).

* Agaricus (Clitocybe) geotrupus Bull.

Agaricus (Clitocybe) metachrous Fr. Harrogate excursion.

* Agaricus (Clitocybe) flaccidus Sow. Scarborough (*G. Massee*).

Agaricus (Clitocybe) fragrans Sow. Studley Royal excursion.

* Agaricus (Clitocybe) angustissimus Lasch.

* Agaricus (Clitocybe) laccatus Scop. Studley Royal excursion; Harrogate excursion; Micklefield (*J. Abbott*); Meanwood Wood, Horsforth, Saltaire (*W. West*); Selby (*W. N. Cheesman*). A common fungus in woods.

* Agaricus (Collybia) radicatus Rehl. Studley Royal excursion; Meanwood Wood, Horsforth (*W. West*); Harewood (*J. Abbott*). Very common.

* Agaricus (Collybia) platyphyllus Fr.

Agaricus (Collybia) fusipes Bull. Harrogate excursion; Birstall (*W. West*).

* Agaricus (Collybia) maculatus A. & S. Harrogate excursion; Scarborough (*G. Massee*); Shipley (*H. T. Soppitt*).

* Agaricus (Collybia) butyraceus Bull. Harrogate excursion; Meanwood Wood.

* Agaricus (Collybia) velutipes Curt.

* Agaricus (Collybia) confluens Pers.

* Agaricus (Collybia) tuberosus Bull. Horsforth (*W. West*); Shipley Glen (*H. T. Soppitt*).

* Agaricus (Collybia) dryophilus Bull. Meanwood.

Agaricus (Collybia) cirrhatus Schum. Meanwood.

* Agaricus (Mycena) rosellus Fr. Beckwithshaw (*H. T. Soppitt*); Harrogate excursion.

* Agaricus (Mycena) purus P. Studley Royal excursion.

Agaricus (Mycena) flavo-albus Fr. Studley Royal excursion.

Agaricus (Mycena) lacteus P. Studley Royal excursion.

Agaricus (Mycena) niveus Quel. Harrogate excursion.

* Agaricus (Mycena) galericulatus Scop. Studley Royal excursion; Meanwood Wood, Allerton (*W. West*); Selby (*W. N. Cheesman*). A common species.

Agaricus (Mycena) polygrammus Bull. Studley Royal excursion.

Agaricus (Mycena) sanguinolentus A. & S. Meanwood.

Agaricus (Mycena) galopus P. Studley Royal excursion; Meanwood Wood.

Agaricus (Mycena) epipterygius Scop. Harrogate excursion; Scarborough (*G. Massee*).

* Agaricus (Mycena) vulgaris P. Scarborough (*G. Massee*).

Agaricus (Mycena) corticola Schum. Studley Royal excursion.

* Agaricus (Pleurotus) dryinus P. Studley Royal excursion.

* Agaricus (Pleurotus) ulmarius Bull. On elm in a timber yard, Selby (*W. N. Cheesman*).

* Agaricus (Pleurotus) ostreatus Jacqn. Harewood (*J. Abbott*).

* Agaricus (Pluteus) cervinus Schæff. Scarborough (*G. Massee*).

* Agaricus (Entoloma) sinuatus Fr. Studley Royal excursion.

* Agaricus (Entoloma) sericeus Bull. Saltaire (*H. T. Soppitt*); Harrogate (*J. Abbott*).

Agaricus (Nolanea) pascuus P. Harrogate excursion; Studley Royal excursion.

* Agaricus (Nolanea) pisciodorus Ces. Studley Royal excursion.

* Agaricus (Claudopus) variabilis P. Harrogate excursion; Meanwood wood; Beckwithshaw (*H. T. Soppitt*).

* Agaricus (Pholiota) terrigenus Fr.

* Agaricus (Pholiota) radicosus Bull.

* **Agaricus (Pholiota) squarrosus** Müll. Studley Royal excursion; Harewood (*J. Abbott*).

Agaricus (Pholiota) mutabilis Schæff. Studley Royal excursion; Meanwood wood; Askham Bog (*T. Lister* and *G. Massee*).

Agaricus (Pholiota) marginatus Batsch. Studley Royal excursion.

* **Agaricus (Inocybe) pyriodorus** Pers. Studley Royal excursion.

Agaricus (Inocybe) scaber Müll. Harrogate excursion.

* **Agaricus (Inocybe) rimosus** Bull. Harrogate excursion; Studley Royal excursion.

Agaricus (Inocybe) geophyllus Sow. Harrogate excursion; Studley Royal excursion; Meanwood.

* **Agaricus (Flammula) hybridus** Fr.

Agaricus (Naucoria) scorpioides Fr. Meanwood wood.

Agaricus (Galera) hypnorum Batsch. Studley Royal excursion; Meanwood Wood, Bingley (*W. West*).

* **Agaricus (Crepidotus) mollis** Schæff. Studley Royal excursion.

* **Agaricus (Psalliota) campestris** L.

* **Agaricus (Stropharia) æruginosus** Curt. Harrogate excursion; Birstall (*W. West*); Mapplewell (*A. P. Taylor*).

Agaricus (Stropharia) squamosus Fr. Harrogate excursion.

* **Agaricus (Stropharia) semiglobatus** Batsch. Harrogate excursion; Studley Royal excursion; Horsforth and Birstall (*W. West*). A very common fungus in pastures.

* **Agaricus (Hypholoma) sublateritius** Schæff. Harrogate excursion; Meanwood Wood; Horsforth (*W. West*).

* **Agaricus (Hypholoma) fascicularis** Huds. Harrogate excursion; Studley Royal excursion; Meanwood Wood; Birstall (*W. West*). Very abundant; in dense clusters on stumps.

* **Agaricus (Hypholoma) lacrymabundus** Fr. Harrogate excursion.

* Agaricus (Hypholoma) appendiculatus Bull.

* Agaricus (Psilocybe) ericæus P. Baildon Moor (*H. T. Soppitt*).

Agaricus (Psilocybe) semilanceatus Fr. Studley Royal excursion.

* Agaricus (Panæolus) separatus L. Studley Royal excursion; Cookridge, Birstal, and Saltaire (*W. West*). Common on dung in pastures.

* Agaricus (Panæolus) fimiputris Bull. Studley Royal excursion.

* Agaricus (Panæolus) papilionaceus Fr.

* Agaricus (Psathyrella) gracilis Fr.

* Agaricus (Psathyrella) atomatus Fr. Studley Royal excursion.

* Agaricus (Psathyrella) disseminatus P.

* Coprinus comatus Fr. Studley Royal excursion; Bradford (*W. West*); Selby (*W. N. Cheesman*).

* Coprinus atramentarius Fr. Studley Royal excursion; Selby (*W. N. Cheesman*).

* Coprinus micaceus Fr. Studley Royal excursion.

Coprinus ephemerus Fr. Harrogate excursion; Studley Royal excursion.

Coprinus plicatilis Fr. Studley Royal excursion.

* Cortinarius cærulescens Fr. Studley Royal excursion.

Cortinarius collinatus Fr. Studley Royal excursion.

* Cortinarius elatior Fr. Harrogate excursion; Scarborough (*G. Massee*).

* Cortinarius cinnamomeus Fr. Selby (*W. N. Cheesman*).

Cortinarius hinnuleus Fr. Harrogate excursion.

Cortinarius castaneus Fr. Studley Royal excursion.

* Paxillus involutus Fr. Harrogate excursion; Studley Royal excursion; Saltaire, Meanwood wood; Horsforth, Birstal (*W. West*). Common in wooded districts.

* Hygrophorus cossus Fr. Studley Royal excursion.

* Hygrophorus penarius Fr. = *Agaricus nitens* Sow. t. 78.

* **Hygrophorus hypothejus** Fr. Harrogate excursion; Scarborough (*G. Massee*).
* **Hygrophorus pratensis** Fr. Studley Royal excursion.
* **Hygrophorus virgineus** Fr. Harrogate excursion; Studley Royal excursion; York (*J. E. Clark*); Selby (*W. N. Cheesman*).

Hygrophorus fornicatus Fr. Studley Royal excursion.

* **Hygrophorus lætus** Fr.
* **Hygrophorus coccineus** Fr. Studley Royal excursion; Skipwith (*W. N. Cheesman*).
* **Hygrophorus puniceus** Fr. Studley Royal excursion.
* **Hygrophorus conicus** Fr. Studley Royal excursion; Skipwith (*W. N. Cheesman*).
* **Hygrophorus chlorophanus** Fr.
* **Hygrophorus psittacinus** Fr. Studley Royal excursion.

Hygrophorus unguinosus Fr. Studley Royal excursion; Meanwood Wood.

* **Hygrophorus glauco-nitens** Fr.
* **Lactarius torminosus** Fr. Harrogate excursion; Scarborough (*G. Massee*).
* **Lactarius turpis** Fr. Meanwood Wood, Saltaire, and Horsforth (*W. West*).
* **Lactarius blennius** Fr. Harrogate excursion; Horsforth (*W. West*).
* **Lactarius trivialis** Fr.
* **Lactarius uvidus** Fr. Harrogate excursion.
* **Lactarius vellereus** Fr.
* **Lactarius deliciosus** Fr. Scarborough (*G. Massee*).
* **Lactarius theiogalus** Fr. Harrogate excursion.
* **Lactarius chrysorrheus** Fr. Harrogate excursion.
* **Lactarius rufus** Fr. Scarborough (*G. Massee*).

Lactarius mammosus Fr. Meanwood Wood.

* **Lactarius glyciosmus** Fr. Harrogate excursion; Saltaire (*H. T. Soppitt*). Pleasant scented, smell compared to cocoa-nut by Mr. Abbott.

* **Lactarius volemum** Fr. Shipley Glen (*H. T. Soppitt*). A rare species.

* **Lactarius serifluus** Fr. Harrogate excursion; Studley Royal excursion; Horsforth (*W. West*).

* **Lactarius mitissimus** Fr. Studley Royal excursion.

Lactarius subdulcis Fr. Harrogate excursion; Studley Royal excursion; Meanwood Wood.

* **Russula nigricans** Fr. Harrogate excursion; Studley Royal excursion.

* **Russula lepida** Fr.

* **Russula rubra** Fr. Harrogate excursion; Micklefield and Harewood (*J. Abbott*).

* **Russula cyanoxantha** Fr. Scarborough (*G. Massee*).

* **Russula heterophylla** Fr.

* **Russula consobrina** Fr.

Russula fœtens Fr. Harrogate excursion; Meanwood Wood; Scarborough (*G. Massee*).

* **Russula fellea** Fr. Studley Royal excursion.

* **Russula queletii** Fr.

* **Russula emetica** Fr. Studley Royal excursion; Horsforth; Birstal; Allerton; Saltaire (*W. West*); Harewood (*J. Abbott*); Selby; Escrick (*W. N. Cheesman*). A very common species in woods.

* **Russula ochroleuca** Fr. Harrogate excursion; Meanwood Wood; Horsforth (*W. West*); Harewood (*J. Abbott*).

* **Russula fragilis** Fr. Harrogate excursion; Studley Royal excursion.

Russula alutacea Fr. Studley Royal excursion.

Russula lutea Fr. Harrogate excursion.

* **Cantharellus aurantiacus** Fr. Harrogate excursion; Scarborough (*G. Massee*).

Cantharellus tubæformis Fr. Bingley (*H. T. Soppitt*).

Cantharellus infundibuliformis Fr. Studley Royal excursion.

Nyctalis parasitica Fr. Scarborough (*G. Massee*).

* **Marasmius urens** var. **peronatus** Fr. Studley Royal excursion; Meanwood Wood; Selby (*W. N. Cheesman*).

* **Marasmius oreades** Fr. Bingley (*H. T. Soppitt*); Selby (*W. N. Cheesman*).

* **Marasmius erythropus** Fr. Studley Royal excursion; Scarborough (*G. Massee*).

* **Marasmius ramealis** Fr. Studley Royal excursion.

* **Marasmius androsaceus** Fr. Studley Royal excursion; Beckwithshaw (*H. T. Soppitt*).

Marasmius epiphyllus Fr. Studley Royal excursion.

Schizophyllum commune Fr. Scarborough (*G. Massee*).

Lenzites sepiarius Fr. Scarborough (*G. Massee*).

Boletus elegans Schum. Harrogate excursion.

* **Boletus flavidus** Fr.

* **Boletus granulatus** L. Harrogate excursion.

* **Boletus badius** Fr. Harrogate excursion; Scarborough (*G. Massee*).

* **Boletus variegatus** Swartz. Scarborough (*G. Massee*).

Boletus bovinus Fr. Scarborough (*G. Massee*).

* **Boletus subtomentosus** L. Scarborough (*G. Massee*); Harrogate excursion.

Boletus edulis Bull. Selby (*W. N. Cheesman*).

* **Boletus luridus** Schæff.

* **Boletus laricinus** Berk. Scarborough (*G. Massee*).

* **Boletus scaber** Fr. Harrogate excursion; Saltaire (*W. West*); Scarborough (*G. Massee*).

* **Fistulina hepatica** Fr. Malton (*J. Muckle*); Studley Royal excursion.

* **Polyporus squamosus** Fr. Studley Royal excursion; Birstal, Shipley, Bradford (*W. West*); Scarborough (*G. Massee*). Very common, especially on ash trunks.

Polyporus elegans var. **nummularius** Fr. Studley Royal excursion.

* **Polyporus lucidus** Fr.

* **Polyporus giganteus** Fr. Studley Royal excursion; Saltaire (*W. West*).
* **Polyporus sulphureus** Fr.
Polyporus cæsius Fr. Studley Royal excursion.
* **Polyporus adustus** Fr. Studley Royal excursion; Boston Spa (*J. Emmett*).
* **Polyporus adiposus** B. and Br.
* **Polyporus hispidus** Fr. Scarborough (*G. Massee*).
* **Polyporus chioneus** Fr. Scarborough (*G. Massee*).
* **Polyporus dryadeus** Fr. Studley Royal excursion.
* **Polyporus betulinus** Fr. Thorne Waste (*H. T. Soppitt*).
* **Polyporus fomentarius** Fr.
* **Polyporus igniarius** Fr.
* **Polyporus annosus** Fr. Studley Royal excursion; Meanwood; Scarborough (*G. Massee*).
* **Polyporus versicolor** Fr. Studley Royal excursion; Selby (*W. N. Cheesman*); Harrogate excursion.
* **Polyporus vulgaris** Fr. Harrogate excursion; Studley Royal excursion.
* **Polyporus perennis** Fr. Selby, plentiful (*W. N. Cheesman*). Usually a rare species.
Polyporus sanguinolentus Fr. Church Fenton, covering the underside of several railway sleepers. Becomes blood red when touched. Uncommon.
* **Trametes rubescens** Fr.
* **Dædalea quercina** Pers. Selby (*W. N. Cheesman*).
Dædalea confragosa Pers. Askham Bog (*T. Lister* and *G. Massee*). Rare.
* **Merulius lacrymans** Fr. Wentworth Woodhouse.
* **Hydnum repandum** L. Studley Royal excursion; Scarborough (*G. Massee*).
Hydnum coralloides Scop. Very rare.
Odontia fimbriata Pers. Studley Royal excursion.
Thelephora terrestris Ehr. Horsforth (*W. West*).
* **Thelephora laciniata** Pers. Studley Royal excursion; Micklefield; Selby (*W. N. Cheesman*).

* **Stereum purpureum** Pers.
* **Stereum hirsutum** Fr. Studley Royal excursion.
* **Stereum spadiceum** Fr.
Stereum sanguinolentum Fr. Horsforth (*W. West*).
Phlebia vaga Fr. Scarborough (*G. Massee*).
* **Peniophora quercina** Fr. Studley Royal excursion; Meanwood Wood.
* **Corticium serum** var. **sambuci** Fr. Scarborough (*G. Massee*).
Solenia ochracea Hoffm. Studley Royal excursion.
Cyphella curreyi B. and Br. Scarborough (*G. Massee*).
* **Clavaria fastigiata** L. Studley Royal excursion.
Clavaria coralloides L. Micklefield.
* **Clavaria cinerea** Bull. Meanwood Wood; Studley Royal excursion.
Clavaria cristata Pers. Studley Royal excursion.
* **Clavaria rugosa** Bull. Harrogate excursion.
* **Clavaria fusiformis** Sow. Micklefield.
* **Clavaria inæqualis** Fl. Dan. Shipley Glen (*H. T. Soppitt*).
* **Clavaria argillacea** Fr. Horsforth (*W. West*).
* **Clavaria vermicularis** Scop.
* **Calocera viscosa** Fr. Harrogate excursion; Horsforth (*W. West*).
* **Calocera cornea** Fr. Harrogate excursion.
Typhula erythropus Desm. Horsforth (*W. West*).
* **Tremella foliacea** Pers. Scarborough (*G. Massee*).
Tremella frondosa Fr. Scarborough (*G. Massee*).
* **Tremella mesenterica** Retz.
Exidia glandulosa Fr. Studley Royal excursion.
Dacrymyces deliquescens Duby. Studley Royal excursion; Harrogate excursion.
* **Dacrymyces stillatus** Nees.

GASTEROMYCETES.

* **Phallus impudicus** L. Studley Royal excursion; Meanwood Wood; Saltaire (*W. West*); Escrick (*W. N.*

Cheesman); Osbaldwick (*J. E. Clark*). Odour overpowering.

* **Cynophallus caninus** Fr. Scarborough (*G. Massee*).

Geaster fimbriatus Fr. Studley Royal excursion.

* **Lycoperdon giganteum** Batsch. Arthington (*M. Taylor*).

* **Lycoperdon gemmatum** Fr. Studley Royal excursion; Saltaire (*W. West*); Micklefield (*J. Abbott*).

* **Lycoperdon pyriforme** Schæff. Studley Royal excursion.

* **Scleroderma vulgare** Fr. Meanwood; Horsforth (*W. West*); Cliff Wood (*W. N. Cheesman*).

* **Scleroderma bovista** Fr. Studley Royal excursion.

Lycogala epidendrum Fr. Horsforth (*W. West*); Barlby (*W. N. Cheesman*).

Physarum nutans P. Horsforth (*W. West*); Harewood (*J. Abbott*).

Angioridium sinuosum Grev. Horsforth (*W. West*).

* **Comatricha friesiana** D.By. Horsforth (*W. West*).

* **Cyathus vernicosus** DC. Selby (*W. N. Cheesman*).

* **Crucibulum vulgare** Tul.

* **Ptychogaster albus** Corda. Harrogate excursion. A doubtful plant.

CONIOMYCETES.

Torula sporendonema B. and Br. Micklefield (*Vize*). On cheese at Liversedge Vicarage. As *Zasmidium cellare* is highly prized in a wine cellar, so is this *Torula* by those whose cheeses will grow it.

Torula pulveracea Corda. Micklefield (*Vize*).

Bactridium flavum Kze. Studley Royal excursion.

Trichia rubiformis P. Micklefield (*Vize*).

Trichia chrysosperma DC. Micklefield (*Vize*); Horsforth (*W. West*).

Puccinia menthæ P. Studley Royal excursion.

Puccinia violarum Lk. Studley Royal excursion.

Puccinia lapsanæ Fckl. Studley Royal excursion.

Puccinia linearis Rob. Meanwood Wood.
Uredo circeæ A. and S. Studley Royal excursion.
Uredo bifrons Grev. Studley Royal excursion.
Bispora monilioides Corda. Studley Royal excursion.
Trachyspora alchemillæ Pers. Studley Royal excursion.
Trichobasis oblongata Berk. Studley Royal excursion.
Trichobasis labiatarum Lev. Studley Royal excursion.
Trichobasis geranii Berk. Studley Royal excursion.
Coleosporium tussilaginis Lev. Studley Royal excursion.
Lecythea caprearum Lev. Studley Royal excursion.
* **Æcidium compositarum** var. **tussilaginis** Pers. Selby (*W. N. Cheesman*).

HYPHOMYCETES.

Isaria arachnophila Ditm. Church Fenton (*W. West*).
Ceratium hydnoides A. & S. Scarborough (*G. Massee*).
Stilbum tomentosum Schrad. Scarborough (*G. Massee*). Parasitic on Trichia, the latter a very minute fungus.
Stilbum fimetarium B. and Br. Scarborough (*G. Massee*).
Stilbum erythrocephalum Ditm. Scarborough (*G. Massee*).
Stilbum pellucidum Schrad. Horsforth (*W. West*).
Stilbum vulgare Tode. Scarborough (*G. Massee*).
* **Ægerita candida** P. Scarborough (*G. Massee*).
Peronospora ficariæ Tul. Studley Royal excursion; Micklefield (*Vize*).
Peronospora infestans Mont. Liversedge (*Vize*).
Polyactis cana Berk. Micklefield (*Vize*).

PHYSOMYCETES.

Pilobolus crystallinus Tode. Bramhope (*J. Abbott*).

ASCOMYCETES.

* **Helvella crispa** Fr. Studley Royal excursion; Harrogate excursion.

* **Helvella lacunosa** Afz. Saltaire (*H. T. Soppitt*).
* **Leotia lubrica** P. Studley Royal excursion.
Geoglossum difforme Fr. Studley Royal excursion.
* **Peziza badia** P. Harrogate excursion; Meanwood.
* **Peziza aurantia** Fr. Studley Royal excursion; Harrogate excursion; Horsforth (*W. West*); Naburn (*W. N. Cheesman*).
* **Peziza vesiculosa** Bull. Scarborough (*G. Massee*).
Peziza macropus P. Harrogate excursion.
Peziza granulata Bull. Studley Royal excursion.
Peziza scutellata L. Micklefield (*Vize*); Skipwith (*W. N. Cheesman*).
Peziza virginea Batsch. Harrogate excursion; Micklefield (*Vize*).
* **Peziza calycina** Schum. Studley Royal excursion; Harrogate excursion; Micklefield (*Vize*).
Peziza hyalina P. Harrogate excursion.
Peziza cinerea Batsch. Harrogate excursion; Micklefield (*Vize*).
Peziza coronata Bull. Meanwood Wood, exceptionally fine; Micklefield (*Vize*).
Peziza crouani Cke. Horsforth (*W. West*).
Helotium aciculare Fr. Horsforth (*W. West*).
* **Helotium æruginosum** Fr. Scarborough (*G. Massee*).
Helotium virgultorum Fr. Studley Royal excursion.
* **Helotium pruinosum** Jord. Scarborough (*G. Massee*).
Ascobolus furfuraceus P. Studley Royal excursion.
* **Bulgaria inquinans** Fr. Studley Royal excursion; Harrogate excursion.
Bulgaria sarcoides Fr. Harrogate excursion; Studley Royal excursion. Common on fallen wood.
Rhytisma acerinum Fr. Studley Royal excursion; Micklefield (*Vize*). Forming black blotches on the leaves of the sycamore. Common.
Stegia ilicis Fr. Meanwood Wood; Horsforth (*W. West*).

Trochila lauro-cerasi Fr. Studley Royal excursion.

* Hypomyces rosellus Tul. Parasitic on *Corticium*. Harrogate excursion.

* Hypomyces lateritius Tul. On *Lactarius deliciosus*. Scarborough (*G. Massee*).

* Hypomyces chrysospermus Tul. Conidia only. Studley Royal excursion.

* Hypomyces torminosus Tul. On *Lactarius torminosus*. Scarborough (*G. Massee*).

* Xylaria polymorpha Grev. Studley Royal excursion.

* Xylaria hypoxylon Grev. Studley Royal excursion; Micklefield (*Vize*); Horsforth (*W. West*); Meanwood (*Abbott*); Selby (*W. N. Cheesman*). Very common on fallen wood. Called candle-snuff fungus.

* Hypoxylon concentricum Grev. Wetherby.

* Hypoxylon fuscum. Studley Royal excursion.

* Ustulina vulgaris Tul. Studley Royal excursion.

* Diatrype stigma Fr. Studley Royal excursion.

Diatrype verrucæformis Fr. Micklefield (*Vize*).

* Diatrype ferruginea Fr. Studley Royal excursion.

* Valsa leiphemia Fr. Meanwood.

* Nectria cinnabarina Fr. Studley Royal excursion.

Nectria sanguinea Fr. Studley Royal excursion.

* Nectria aquifoliæ Berk. Scarborough (*G. Massee*).

* Sphæria spermoides Hoffm. Horsforth (*W. West*)

* Sphæria moriformis Tode. Studley Royal excursion.

* Sphæria pulvis-pyrius P. Micklefield (*Vize*).

METEOROLOGY OF BRADFORD FOR 1885.

Computed from daily observations made at the Exchange, Bradford,

By John McLandsborough, F.R.A.S., F.R.Met.Soc., F.G.S., and Alfred Eley Preston, Assoc. M. Inst. C.E., F.R.Met.Soc., F.G.S.

Latitude, 53deg. 47min. 38sec. N.; longitude, 1deg. 45min. 4sec. W. Height above mean sea level, 366ft.

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Pressure of Atmosphere in Month.

Months	Highest Reading of Barometer	Date	Mean of Highest of 17 Years	Lowest Reading of Barometer	Date	Mean of Lowest of 17 Years	Range	Corrected for Capillarity and Temperature: Mean	Mean of 17 Years
	Ins	On	Ins	Ins	On	Ins	Ins	Ins	Ins
January	30 000	1st	30 188	28 460	11th	28 008	1 600	29 454	29 62[illegible]
February	29 770	21st	30 048	28 587	2nd	28 740	1·183	29 178	29 418
March	30 273	11th	30 131	28 984	4th	28 810	1 289	29 6[illegible]4	29 507
April	29 978	19th	30 070	28 810	25th	28 819	1 168	29 379	29 473
May	29 8[illegible]4	12th	30 065	28 909	21st	29 040	0 905	29 [illegible]18	29 555
June	30 046	10th	30 102	29 033	20th	29 144	1 013	29 621	29 546
July	30 133	22nd	29 9[illegible]2	29 452	19th	29 171	0 681	29 764	29 522
August	29 980	15th	29 985	29 106	10th	29 060	0 874	29 558	29 516
September	29 923	22nd	30 000	28 872	30th	28 94	1 051	29 406	29 490
October	29 913	15th	30 122	28 550	26th	28 744	1 363	29 070	29 488
November	30 060	16th	30 032	28 658	28th	28 886	1 402	29 490	29 443
December	29 238	23rd	30 101	28 029	4th	28 704	1 209	29 745	29 477
Means, or totals	30 011		30 066	28 656		28 683	1 145	29 517	29 498

Temperature of Air in Shade during Month.

Months	Highest	Date	Mean of Highest of 17 Years	Lowest	Date	Mean of Lowest of 17 Years	Range	In Each Month: Of all Highest	Mean of 17 Years	Of all Lowest	Mean of 17 Years	Mean Daily Range: Mean	Mean of 17 Years	Of Dry Bulb: Mean	Mean of 17 Years
	Deg	On	Deg	Deg	On	Deg	Deg	Deg	Deg.	Deg.	Deg	Deg	Deg	Deg	Deg
January	53 8	30th	52 8	25 0	22nd	23 8	28 8	40 9	43 1	33·7	34 6	[illegible]8	0 7	37 4	39 4
February	68 0	26th	54 0	24 0	21st	28 8	34 0	47 6	44 8	38 4	36 8	[illegible]1	8 0	41 6	40 3
March	51 3	21st	56 8	20 0	10th	26 8	21 3	45 3	47 0	33 9	35 8	[illegible]4	11 4	39 1	40 8
April	65 8	26th	64 9	[illegible]8 8	4th	31 4	37 2	51 7	53 3	38 6	38 8	[illegible]1	13 6	45 0	45 2
May	67 9	29th	69 7	32 4	12th	34 7	35 6	54 8	58 6	40 7	43 6	[illegible]1	14 9	46 3	48 4
June	80 6	5th	77 4	40 9	27th	41 8	39 7	65 3	65 2	49 0	50 [illegible]	[illegible]3	16 2	55 1	56 7
July	82·2	27th	80 8	44·8	13th	46 9	37 4	69 0	68 8	62 8	54 0	[illegible]2	14 8	59 4	60 4
August	71 0	17th	76 6	42 0	14th	45 9	28 0	62 2	67 5	49 8	53 2	[illegible]6	14 4	54 8	60 1
September	70 0	16th	70 7	[illegible]5 0	28th	40 2	35 0	60 0	62 2	46 6	49 5	[illegible]4	12	53 0	54 6
October	67 9	1st	63 7	[illegible]4 0	30th	32 7	23 9	50 2	54 0	40 7	43 3	[illegible]6	10 7	44 9	48 3
November	57 4	4th	56 4	26 2	17th	28 2	31 2	46·3	47 2	38 4	36 0	[illegible]9	9 1	42·1	42 8
December	48 8	18th	53 0	22 [illegible]	11th	23 2	28 7	43 4	42 7	34 3	34 3	[illegible]1	6 4	39 6	39 2
Means, or totals	53 7		64 9	[illegible]2 1		33 6	31 8	53 1	54 5	41 2	42 8	[illegible]9	11 9	46 5	47 9

Adopted Mean Temperature; Vapour.

Months	Of Air: Mean	Mean of 17 Years	Of Evaporation: Mean	Mean of 17 Years	Dew Point: Mean	Mean of 17 Years	Elastic Force: Mean	Mean of 17 Years	In a Cubic Foot of Air: Mean	Mean of 17 Years	Short of Saturation	Mean of 17 Years	Mean Weight of a Cubic Foot of Air	Mean of 17 Years	Degree of Humidity (Complete Saturation = 100): Highest	Date	Mean of Highest of 17 Years	Lowest	Date	Mean of Lowest of 17 Years	Mean	Mean of 17 Years
	Deg	Deg	Deg	Deg	Deg	Deg	Ins	Ins	Grs.	Grs	Grs	Grs	Grs	Grs	0—100	On	0—100	0—100	On	0—100	0—100	0—100
January	37 1	38 9	36 6	37 2	33 6	34 9	·192	205	2 2	2 4	0 4	0 4	550	549	100	23rd	97	74	8th	67	87	66
February	41 6	40 1	39 8	38·4	37 7	36 1	226	214	2 8	2 5	0 4	0 4	540	546	99	22nd	97	55	24th	69	87	86
March	38 8	40 5	36 2	38 1	32 7	35 1	188	206	2 2	2 4	0 6	0 5	551	547	98	4th	98	50	27th	57	80	83
April	44 3	45 2	40 7	41 8	36 5	37 9	216	231	2 5	2 7	0 8	0 8	540	541	97	6th	94	41	28th	64	74	78
May	48 0	49 3	42 4	45 0	38 3	40 9	233	257	2 7	2 8	0 9	1 1	5[illegible]7	537	93	1st	97	43	27th	45	75	73
June	56 2	56 7	50 2	51 2	45 4	46 8	305	321	3 4	3 6	1 6	1 4	533	531	99	24th	93	32	4th	49	70	72
July	59 2	60 2	53 9	54 5	49 2	50 4	360	388	4 0	4 1	1 7	1 7	531	528	87	27th	91	44	14th	50	70	70
August	54 6	58 9	50 2	54 2	48 0	50 5	310	368	3 5	4 1	1 3	1 5	532	526	91	6th	92	48	14th	52	73	71
September	52 6	54 7	48 8	51 4	45 0	48 1	300	38[illegible]	3 4	3 8	1 0	1 0	532	531	99	18th	95	38	15th	60	77	79
October	44 7	47 9	42 1	45 6	39 0	42 8	230	276	2 7	3 2	0 6	0 6	538	537	97	16th	97	59	12th	62	81	83
November	42 1	42 2	40 4	40 0	38 3	37 2	·232	222	2 7	2 6	0 4	0 6	544	544	100	17th	98	65	4th	63	87	83
December	39 2	38 8	37 6	36 8	36 6	34 4	·208	200	2 4	2 3	0 4	0 4	552	548	98	18th	98	72	4th	68	87	65
Means, or totals	46 3	47 7	43 2	44 5	39 8	41 2	260	·267	2 9	3 1	0 8	0 9	540	539	97		95	52		68	79	79

Temperature of Air in Sun's Rays; Wind.

Months	Highest	Date	Mean of Highest of 17 Years	Mean	Mean of 17 Years	N	NE	E	SE	S	SW	W	NW
	Deg	On	Deg	Deg	Deg	No	No	No	No	No	No	No	No
January	55 0	30th	60 2	41·8	47 8	2	4	6	8	5	6	0	1
February	87 6	26th	72 1	52 5	52 8	2	2	1	3	6	10	6	0
March	72 2	23rd	84 1	58 1	62 0	6	7	1	4	1	3	2	7
April	88 2	20th	98 2	64 6	73 4	3	6	6	4	4	7	3	2
May	85 0	29th	105 6	75 1	81 6	3	4	1	1	2	8	8	6
June	100 4	14th	111 8	86 8	87 8	6	3	0	4	1	8	6	3
July	113 6	27th	114 3	92 1	92 1	4	5	1	3	1	9	4	4
August	98 2	17th	111 5	81 7	89 6	11	5	3	2	2	4	3	1
September	91 6	6th	100 0	81 1	80 0	4	1	3	0	2	9	8	5
October	79 2	5th	86 4	65 1	66 7	7	5	2	2	0	7	3	6
November	66 6	2nd	71 6	67 1	55 1	3	7	6	2	2	6	3	1
December	50 2	1st	57 3	60 4	46 6	10	2	0	2	1	5	7	4
Means, or totals	81 9		89 4	67 2	69 7	61	51	28	35	26	78	47	39

Wind Pressure; Cloud; Rain.

Months	Pressure: Mean at 9 a.m.	Mean of all Highest	Highest	Direction	Date	Mean Amount of Cloud	Number of Days it fell	Amount Collected	Greatest Daily Fall	Date	Mean of 16 Years	Mean of Seven Years ending with 1882, 65½ft above surface of ground	Mean of 7 Yrs ending with 1882 at T'n Hall and Mid. Rly. Stn. on surface of ground	Greater fall on surface at Town Hall & Mid. Stn. than at 65½ft above surface at Exch.: Depth in Inches	Percentage of fall at Exch'ge
	lb per sq ft	lb per sq ft	lb per sq ft		On	0—10	No	Ins	Ins	On	Ins	Ins	Ins	Ins	Per cent
January	0 8	2 94	9 00	W S W	11th	9 0	18	1 73	0 44	11th	2 70	2 209	2 474	0 265	11 2
February	1 1	4 83	11 00	W	11th	7 9	26	2 77	0 36	18th	2 11	2 609	2·972	0 363	11 4
March	0 6	2 87	13 50	W	21st	7 6	14	1 56	0 42	4th	2 14	2 778	3 260	0 484	11 7
April	0 7	[illegible]33	6 76	S W	1st	7 2	13	1 81	0 73	7th	2 1[illegible]	2 518	2 835	0 319	11 2
May	0 9	3 03	9 00	W	11th	7 2	21	2 39	0 [illegible]5	5th	1 64	[illegible]	2 27[illegible]	0 174	1[illegible] 8
June	0 6	2 47	8 50	S W	5th	6 6	12	2 79	0 71	24th	2 81	2 [illegible]7	3 [illegible]1	0 174	[illegible]
July	0 4	1 32	1 00	S W	8th	5 8	7	0 77	0 40	20th	2 95	3 401	3 641	0 240	1[illegible] 7
August	0 6	2 65	9 50	S S W	13th	7 2	9	0 78	0 23	1[illegible]th	2 [illegible]7	3 654	3 [illegible]92	0 238	1[illegible] 7
September	1 1	3 62	11 50	S S W	15th	8 3	22	2 89	1 2[illegible]	3rd	2 98	2 694	3 [illegible]	0 335	1[illegible] 2
October	1 0	4 02	9 75	S W	3rd	7 2	24	6 13	0 [illegible]0	23rd	3 69	3 640	4 1[illegible]	[illegible]72	11 0
November	0 7	2 13	12 00	W S W	28th	8 0	17	2 29	0 53	27th	2 92	3 421	3 [illegible]	0 407	1[illegible] [illegible]
December	0 9	3·93	15 25	S W	4th	8 3	10	0 76	0 13	5th	2 73	3 681	4 170	0 489	11 3
Means, or totals	0 8	3 02	9 98			7·3	193	26 70	[illegible]54		31 31	35 741	39 601	3 860	11 06

Yearly Maximum and Minimum Atmospheric Pressure, Temperature, and Humidity from 1869 to 1885, and Rainfall from 1870 to 1885, inclusive.

Year.	Pressure, Highest: Reading of Barom. during Year	Date	Pressure, Lowest: Reading of Barom. during Year	Date	Temperature in Shade, Highest: Reading of Maximum Thermom. during Yr	Date	Temperature in Shade, Lowest: Reading of Minimum Thermom. during Yr	Date	Last and First Frost of Season: Date of Last Frost	Date of First Frost	In Sun's Rays, Highest: Reading of Solar Thermom. during Yr	Date	Humidity (Complete Saturation = 100), Highest: Degree of Humidity during Yr	Date	Humidity, Lowest: Degree of Humidity during Yr	Date	Rain: Total for Year	Mean Y'rly Rainfall at Town Hall and Mid. Rly. Stn. on surface of gr'nd	Gr'tr fall on surface at T'n H'll & Mid Stn than at 65½ft ab've surf at Exc: Depth in Inches	Percentage of fall at Exch'ge	Greatest Daily Fall during Yr	Date	Snow, Last and First Snow of Season: Date of Last Snow	Date of First Snow
	Ins		Ins		Deg		Deg.				Deg		0—100		0—100		Ins	Ins.	Ins	Per cent	Ins			
1869	30 290	Dec 6	28 600	Feb 1	85 2	Aug 30	19 8	Dec 28	Mar 27	Oct 20	127 7	Aug. 30	89	Feb 8	42	Sep. 24							April 3	Oct 19
1870	30 284	Jun 19	28 308	Jan 8	85 0	July 26	16 6	Dec 23	Mar 30	Nov 9	127 5	July 25	98	Jan 29	40	July 14	24 120				0 820	June 15	Mar 24	Nov 15
1871	30 162	Mar 28	28 306	Jan 16	84 0	Aug 12	6 7	Jan 1	April 11	Nov 13	128 7	July 17	98	July 7	43	Nov 2	21 640				0 995	June 16	Mar 16	Nov 16
1872	30 168	April 6	28 070	Jan 24	86 4	July 23	24 8	Mar 27	Mar 27	Nov 19	124 8	Aug 19	100	Mar 22	45	Sep 23	42 060				2 490	June 19	Mar 11	Nov 13
1873	30 338	Feb 18	28 022	Jan 20	88 8	July 23	19 2	Feb 24	Mar 14	Nov 6	124 5	July 23	100	Dec 11	41	Mar 26	21 440				1 200	Aug 4	April 25	Jan 3, '74
1874	30·478	Mar 8	28 278	Dec 11	80 9	July 20	16 0	Dec 31	Mar 12	Nov 11	126 8	July 20	100	Feb 6	42	May 18	23 660				0 740	Dec. 7	May 9	Nov 26
1875	30 305	July 7	28 464	Nov 10	80 0	Aug 17	13 0	Jan 1	Mar 22	Nov 26	122 0	July 5	100	Jan 23	43	July 6	30 280				1 700	Nov. 16	Mar 12	Nov 9
1876	30 300	Jan 15	28 070	Dec 4	87 6	July 17	23·0	Jan 9	April 15	Nov 9	126 6	July 16	99	Oct 4	46	May 6	35 270	38 788	4 518	11 [illegible]8	1 810	Oct 9	April 12	Nov 8
1877	30 358	Oct 6	28 300	Nov 29	80 0	June 19	20 0	Mar 1	May 4	Oct 18	116 4	June 19	100	Oct 29	36	May 23	40 650	45 499	4 849	11 [illegible]0	1 420	July 18	May 10	Oct 16
1878	30 320	Mar. 16	28 830	April 1	89 6	July 19	13 8	Dec 28	April 6	Nov 9	118 2	July 22	99	Jan 13	63	Aug 9	35 434	39 010	3 576	11 [illegible]0	1 220	Aug 14	April 1	Nov 8
1879	30 352	Dec 13	28 600	Feb. 10	74 4	July 30	13 2	Dec 7	May 10	Nov 14	101 2	Aug 13	100	Oct. 7	61	Dec. 12	28 017	30 298	2 281	10 82	1 020	June 8	May 7	Nov 20
1880	30 332	Jan 7	28 164	Nov 16	81 3	Sep 6	20 8	Jan 20	Feb 23	Oct 20	112 0	Aug 13	99	Dec 15	50	May 30	35 690	39 616	3 926	11 10	1 710	Oct 27	Mar 2	Oct 27
1881	30 382	May 10	28 250	Oct 14	53 3	July 8	12 0	Jan 28	April 21	Oct 17	110 6	June 1	98	Oct 14	38	May 31	35 434	39 892	4 468	11 21	1 436	Oct 13	April 20	Oct 29
1882	30 644	Jan 18	28 452	Mar 1	77 4	Aug 12	18 8	Dec. 11	April 18	Nov 12	108 0	Aug 9	99	Nov 6	38	May 18	39 683	43 103	3 420	10 [illegible]	1 608	Dec 6	Mar 21	Nov 19
1883	30 600	April 9	28 452	Sep 2	78 2	July 3	19 8	Mar. 10	Mar 29	Nov 12	107 6	May 17	99	Dec 28	30	April 9	34 396				1 338	Sep 28	Mar 24	Nov 10
1884	30 354	Oct 6	28 376	Jan 27	84 4	Aug 12	26 6	Nov. 30	April 24	Nov 24	107 8	Aug 9	98	Jan 23	30	May 22	27 657				1 170	Jan. 23	Feb. 26	Nov 23
1885	30 273	Mar 14	26 400	Jan 11	82 2	July 27	22 1	Dec 11	April 6	Nov. 16	113 6	July 27	100	Jan 23	32	June 4	26 699				1 208	Sep 3	May 7	Dec 9
Means	30 338		28 327		82 7		17 9				110 1		99		41		31 514	39 601	3 860	11 06	1 [illegible]67			

EXPLANATION.

The observations are made at nine a.m., and, with the exception of maximum and minimum thermometer readings, again at three p.m.

The highest and lowest barometric readings for each month, also the monthly range, are given as recorded; while the mean pressure is deduced from bi-daily observations corrected for index error, capillarity, temperature, and diurnal range. To correct for altitude or reduce to sea level (the air temperature being 48 degrees and barometer reading 30 inches at sea level), add ·401 inch to the heights given.

The adopted mean temperature of air is deduced from the dry bulb and the maximum and minimum readings; the temperature of evaporation from the dry and wet bulb and the maximum and minimum readings. The dew point, elastic force of vapour, humidity, &c., are deduced from bi-daily readings of the dry and wet bulb hygrometer, by Glaisher's Hygrometrical Tables, sixth edition.

The solar thermometer has a black bulb enclosed in a vacuum.

The direction and pressure of wind are recorded as indicated by an Anemometer fixed 10½ feet above the ridge of roof of Exchange. The pressure is given in pounds avoirdupois per square foot.

The amount of cloud is estimated by a scale ranging from 0 to 10.

The rain gauge is fixed upon the top of central roof of the Exchange, at an elevation of 65½ feet above the surface of the ground and [illegible]6 feet above mean sea level. As rain gauges on the summit of buildings are generally found to collect less rain than when placed upon the surface of open ground adjacent thereto, steps were taken in 1876 to determine to what extent this was the case with the Exchange rain gauge, when two additional gauges were provided and fixed upon the surface of adjacent open spaces, one near to the Town Hall, the other near to the Midland Railway Station, between which the Exchange gauge is situate about midway, and the surface of ground about the same height. At both of these gauges, as well as at the Exchange gauge, daily observations were made from the commencement of 1876 to the end of 1882, a period of seven years, when the surface gauges were removed in consequence of the ground they occupied being no longer available for the purpose. The particulars of these gaugings are set forth in tables. The results show that the mean yearly rainfall on the surface of ground for the seven years ending with 1882 is 3 86 inches, or 11 08 per cent., greater than at the summit of the Exchange. The mean yearly rainfall recorded at the Exchange for the sixteen years ending with 1885 is 31 314 inches. By adding 11 08 per cent. thereto the mean normal rainfall of central Bradford for such period is found to be 34 783 inches per annum. There are good grounds for concluding that the smaller amount of rainfall collected on the Exchange—and on buildings generally—than on the surface of ground is due to the varying direction and force of wind there producing different currents and eddies, which prevent due precipitation on the top or ridge of roof where the gauge is fixed. The rainfall of 1869 was collected by a gauge placed on the ridge of outer roof of Exchange, near to the north-west corner thereof. This position not being deemed quite satisfactory, the gauge was removed at the end of that year to the ridge of central roof, the place it has since occupied. To avoid risk of inaccurate results the rainfall of 1869 is omitted from these returns.

The instruments with which the observations are made have been verified by comparison with the standards at Kew Observatory.

64.5

THE

TRANSACTIONS

OF THE

YORKSHIRE NATURALISTS' UNION.

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PART 10.

Issued to the Members for the year 1885.

CONTENTS.

Series D—Articulata—Vol. III, Sheets 2 and 3.
List of the Coleoptera of Yorkshire, by Rev. W. C. Hey, M.A.
Carabidæ (concluded), pp. 17—33.
Haliplidæ, pp. 33—35.
Dytiscidæ, pp. 35—48.

Series E—Botany—Sheets 16 and 17.
The Flora of Dewsbury and Neighbourhood, by P. Fox Lee.
pp. 225—248.

[Series E—Botany—Vol. III., three sheets and one map, devoted to the Second Edition of Baker's North Yorkshire, is issued separately with this, as Part 11 of the Transactions.]

Appendix—Meteorology (two sheets).
Meteorology of Bradford for 1886 and for 1887.
By John McLandsborough, F.R.A.S., F.R.Met.S., F.G.S., and Alfred Eley Preston, Assoc.M.Inst.C.E., F.R.Met.S., F.G.S., (presented by the authors).

Appendix—Reprints of Excursion Circulars.
61st Meeting—Askern, Thursday, May 20th, 1886.
62nd Meeting—Flamborough, Whit-Monday, June 14th, 1886.
63rd Meeting—Pateley Bridge, Saturday, July 17th, 1886.
64th Meeting—Pickering, Bank-Holiday Monday, August 2nd, 1886.
66th Meeting—Saltburn-by-the-Sea, Whit-Monday, May 30th, 1887.
67th Meeting—Thirkleby Park, Wednesday, July 20th, 1887.
68th Meeting—Sedbergh, Bank Holiday Monday, Aug. 1st, 1887.
69th Meeting—Welton, Saturday, August 27th, 1887.
70th Meeting—Hatfield Chace, Wednesday, September 21st, 1887.

Appendix—
Proceedings of 25th Annual Meeting at Dewsbury, March, 1887—with List of Members of the Union.

LEEDS: TAYLOR BROS., PRINTERS, SOVEREIGN STREET.

MARCH, 1888.

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Pterostichus niger Schal. Generally distributed and moderately common.

2. N.E.—Scarboro' (*W.K.B.*); Middlesbro' (*B. Hudson*).

3. N.W.—Barnard Castle (*W.C.H.*).

4. CENTRAL.—York, Strensall, &c. (*W.C.H.*); Wetherby (*Nat.*, June, 1877).

5. S.W.—Haw Park and Horbury (*E.B.W.*); Mirfield (*E. Howgate*); Bradford district, common (*J. W. Carter*).

Pterostichus vulgaris L. One of the commonest and most general beetles, occurring everywhere under stones, &c. Some interesting remarks referring to the larva of this or a kindred species will be found in the Zoologist for 1853, xi., 3780 (*R. H. Meade*, Bradford).

1. S.E.—Bridlington (*W.C.H.*).

2. N.E.—Filey; Guisborough (*W.C.H.*).

3. N.W.—Leyburn; Richmond (*W.C.H.*).

4. CENTRAL.—York district in profusion (*W.C.H.*); Pontefract (*H. Crowther*).

5. S.W.—Wakefield district, very plentiful (*E.B.W.*); Sheffield (*E.B.W.*); Mirfield (*E. Howgate*); Bradford district, common (*J. W. Carter*).

Pterostichus nigrita F. Abundant.

2. N.E.—Scarborough (*W.K.B.*).

3. N.W.—Studley (*E.A.W.*); Settle (*W.C.H.*); Leyburn (*W.C.H.*); Blubberhouses (*W. E. Clarke*).

4. CENTRAL.—York district (*W.C.H.*).

5. S.W.—Hebden Bridge (*E.B.W.*); Bradford district, abundant, and very variable in size (*J. W. Carter*).

Pterostichus anthracinus Ill. Local and scarce.

1. S.E.—Hornsea, at the Mere, July, 1859 (*W.K.B.*).

2. N.E.—Scarborough (*R.L.*).

Pterostichus gracilis Dej.

1. S.E.—Hornsea, at the Mere (*W.K.B.*).

Pterostichus minor Gyll.

1. S.E.—Hornsea, at the Mere (*W.K.B.*).

2. N.E.—Scarborough, ten examples, Jan. and Feb., 1859 (*W.K.B.*).

Pterostichus strenuus Panz. Common and general.

1. S.E.—Hornsea (*W.K.B.*); Brough (*E.B. W.*).

2. N.E.—Scarborough (*W.K.B.*); Whitby (*H. Crowther*).

3. N.W.—Studley (*E.A. W.*); Rombald's Moor, common (*J. W. Carter*).

4. CENTRAL.—York district generally (*W.C.H.*); Selby (*E.B. W.*); Wetherby (*E.B. W.*).

5. S.W.—Hebden Bridge, with a black variety (*Dawson, Geod. Brit.*, 1854, p. 111); Bradford district, common (*J. W. Carter*).

Pterostichus diligens Sturm. Another very common species.

1. S.E.—Hornsea (*W.K.B.*).

2. N.E.—Scarborough (*W.K.B.*).

3. N.W.—Studley (*E.A. W.*); Rombald's Moor (*J. W.C.*).

4. CENTRAL.—York district (*W.C.H.*); Pontefract (*H. Crowther*).

Pterostichus oblongopunctatus Germ. This species was recorded for Askham Bryan, in 1830, by Mr. A. Wright (vide *Loudon's Mag.*, 1831, iv., 165); but the most persevering scrutiny has failed to discover it there during the last fifty years.

Pterostichus vitreus Dej. 'Taken sparingly in Yorkshire' (*Stephens*, 1827).

3. N.W.—Rombald's Moor, in spring, of regular occurance (*J. W. Carter*).

5. S.W.—Hebden Bridge (*Dawson, Geod. Brit.*, p. 105).

Pterostichus madidus F. It is hardly necessary to give localities for an insect which lurks under nearly every stone, but I do it for uniformity's sake. I once had a curious proof of its abundance. I had occasion to sink a small glass globe in the soil in my garden at York. Looking into it a few days after, I found quite a pile of these insects at

the bottom. They had fallen into the trap during their nocturnal wanderings.

1. S.E.—Bridlington, Brough, and the chalk district generally (*W.C.H.*, *E.B.W.*, &c.).

2. N.E.—Scarborough (*R.L.*); Filey, Guisborough, and Cleveland generally (*W.C.H.*).

3. N.W. — Richmond, Leyburn, Barnard Castle (*W.C.H.*); Ingleton, Clapham, Ilkley, &c. (*J. W. Carter*).

4. CENTRAL.—Everywhere about York (*W.C.H.*).

5. S.W. — Wakefield district (*E.B.W.*); Mirfield (*E. Howgate*); Bradford district, perhaps the most abundant ground beetle (*J. W. Carter*).

Pterostichus æthiops Panz.

3. N.W.—Two at the base of Ingleborough, April 3rd, 1885 (*J. W. Carter* and *H. T. Soppitt*).

Pterostichus striola F. A common species, widely distributed over Europe.

1. S.E.—Flamborough Head (*W.C.H.*).

2. N.E.—Scarborough (*R.L.*); Whitby (*E.B.W.*).

3. N.W.—Studley (*E.A.W.*); Richmond (*W.C.H.*); Barnard Castle (*W.C.H.*); Rombald's Moor (*J. W. Carter*).

4. CENTRAL.—York district (*W.C.H.*); Wetherby (*Nat., June*, 1877); Milford Junction (*E.B.W.*).

5. S.W.—Wakefield; Rivelin Valley; Thorne; Sheffield (*E.B.W.*); Bradford district (*J. W. Carter*).

Stomis pumicatus Panz. Plentiful and general.

1. S.E.—Brough (*E.B.W.*).

2. N.E.—Whitby (*H. Pollard*); Scarborough (*R.L.*).

3. N.W.—Studley (*E.A.W.*); Masham (*H. Pollard*).

4. CENTRAL. – York district (*W.C.H.*); Pontefract (*E.B.W.*).

5. S.W.—Wakefield; Hebden Bridge (*E.B.W.*); Bradford district (*J. W. Carter*).

Amara fulva DeG. This species is rather local, but is sometimes abundant in sandy places.

1. S.E.—Bridlington (*W.C.H.* and *W.W.F.*); Hornsea, in July (*W.K.B.*).

2. N.E.—Scarborough (*R.L.*); Guisborough, among shale (*W.C.H.*).

4. CENTRAL.—York (*W.C.H.*); Selby, in the river banks (*W.C.H.*).

5. S.W.—Low Moor, near Bradford, under shale and stones (*Dawson, Geod. Brit.*).

Amara apricaria Payk. Tolerably common and general.

1. S.E.—Bridlington, under seaweed (*W.C.H.*); Brough (*E.B.W.*).

2. N.E.—Scarborough, Jan. and Feb., 1859 (*W.K.B.*); Banks of the Tees, abundantly (*L. Rudd*).

3. N.W.—Studley (*E.A.W.*).

4. CENTRAL.—York district (*W.C.H.*).

5. S.W.—Wakefield, Wentbridge, &c., common (*E.B.W.*); Bradford district (*J. W. Carter*).

Amara consularis Duft. Only one record, viz.:

1. S.E.—Bridlington (*W.W.F.*).

Amara spinipes L. This species has only been taken very sparingly.

1. S.E.—Filey (*W.W.F.*).

2. N.E.—Banks of the Tees (*L. Rudd*).

4. CENTRAL.—Selby, by sweeping Senecio in Sept. (*W.C.H.*).

Amara convexiuscula Marsh. Local and apparently confined to sandy districts near the coast.

1. S.E.—Bridlington, South Cliffs (*W.C.H.*); Hornsea, sandhills and cliffs (*W.K.B.*); Spurn (*W. Hey*).

2. N.E.—Shores of the Tees, abundant, 1828 (*L. Rudd*).

Amara bifrons Gyll. Locally abundant.

1. S.E.—Bridlington, July, 1867, in great plenty (*W.C.H.*); Spurn, Sept. 3rd, 1884 (*W.C.H.*).

2. N.E.—Scarborough (*R.L.*).

Amara rufocincta Dej. Only one record of this species has come to hand.

2. N.E.—Scarborough, in Ayton Quarries, July, 1858, a pair (*W.K.B.*, *Zool.*, 1860).

Amara tibialis Payk. Another uncommon species.

2. N.E.—Scarborough, Feb. (*W.K.B.*); Tees Bank, 1828 (*L. Rudd*).

4. CENTRAL.—Askham Bryam, 1830 (*A. Wright*).

5. S.W.—One, Baildon, 1886 (*J. W. Carter*).

Amara familiaris Duft. Frequent and general.

1. S.E.—Bridlington (*W.C.H.*); Brough (*E.B.W.*).

2. N.E.—Scarborough (*W.K.B.*).

3. N.W.—Rombald's Moor, 1886 (*J. W. Carter*).

4. CENTRAL.—York, Strensall (*W.C.H.*).

5. S.W.—Wakefield district, common (*E.B.W.*).

Amara acuminata Pk. Not uncommon—especially about Bridlington, which is for some reason the undoubted head-quarters of the genus *Amara* in Yorkshire, if not in England.

1. S.E.—Bridlington (*W.C.H.*); Hornsea (*W.K.B.*).

4. CENTRAL.—York, in flood refuse (*W.C.H.*).

5. S.W.—Newton (*E.B.W.*).

Amara trivialis Gyll. Perhaps the commonest species of the genus, often met with on lawns and pathways on sunny days.

1. S.E.—Bridlington (*W.C.H.*).

2. N.E.—Scarborough (*W.K.B.*).

4. CENTRAL.—York district (*W.C.H.*).

5. S.W.—Wakefield district (*E.B.W.*).

Amara communis Panz. I have never met with this species in Yorkshire, nor is it recorded by Bissill, Lawson, Waterhouse, Fowler, or Rudd. I am, therefore, rather surprised at the following records.

2. N.E.—Whitby (*H. Pollard*).

4. CENTRAL.—Wetherby; Pontefract (*Naturalist*, April and May, 1877).

5. S.W.—Wakefield (*E.B.W.*); Bradford, one, 1882 (*J. W. Carter*).

Amara similata Gyll. Probably commoner than the records indicate.

2. N.E.—'North Riding' (*E.B.W.*).

4. CENTRAL.—York district (*W.C.H.*).

5. S.W.—Wakefield (*E.B.W.*); Bradford district, 1886 (*J. W. Carter*).

Amara plebeia Gyll. The same remark applies also to this species.

2. N.E.—Scarborough (*W.K.B.*).

4. CENTRAL.—Strensall; Selby (*W.C.H.*).

5. S. W.—Bradford district, common (*J. W. Carter*).

LICININA.

Licinus depressus Payk. Two old records of the capture of this species are the only ones I know of, viz.:

1. S.E.—Hull, taken by Mr. Watson, as appears by Mr. Marsham's MSS., in 1807, vide Stephens' Syst. Cat. Brit. Ins., 1829, p. xviii. of introduction.

5. S.W. — Halifax, 'common' (*MS. R. Leyland (?)* 1822).

Badister bipustulatus F. Common and general.

1. S.E.—Brough (*E.B.W.*).

2. N.E.—Scarborough (*R.L.*); Whitby (*H. Crowther*).

3. N.W.—Studley (*E.A.W.*); Ilkley (*E.B.W.*).

4. CENTRAL.—York, Selby, Pilmoor (*W.C.H.*).

5. S.W.—Wakefield district (*E.B.W.*).

Badister sodalis Duft.

2. N.W.—Studley, in moss by the side of a little hill-side stream, June (*E.A.W.*).

PLATYNINA.

Sphodrus leucophthalmus L. Rare; I only know of two or three occurrences of the insect in Yorkshire.

2. N.E.—Scarborough, one specimen in a workshop (*R.L.*).

5. S.W.—Halifax, one specimen, taken in a house in January (*R. Leyland (?)* 1822); Huddersfield, 1884 (*S. L. Mosley*).

Pristonychus terricola Dej. Also uncommon.

2. N.E.—Scarborough (*W.K.B.*).

3. N.W.—Studley (*E.A. W.*).

5. S.W.—Frequent in cellars in Bradford Borough (*J. W. Carter*).

Calathus cisteloides Ill. A most abundant species.

1. S.E. — Bridlington, Speeton (*W.C.H.*); Brough (*E.B.W.*).

2. N.E.—Scarborough (*R.L.* and *W.K.B.*); Redcar (*W.C.H.*).

3. N.W.—Studley (*E.A. W.*); Rombald's Moor (*J. W. Carter*).

4. CENTRAL.—One of the commonest insects in the York district (*W.C.H.*); Selby (*W.C.H.*).

5. S.W.—Wakefield, abundant (*E.B.W.*); Bradford (*R. H. Meade*).

Calathus flavipes Fourc. Very local.

1. S.E.—Hornsea, June (*W.K.B.*).

2. N.E.—Shores of the Tees, abundant (*L. Rudd*).

3. N.W.—Rombald's Moor, very abundant (*J. W. Carter*).

Calathus mollis F.

1. S.E.—Hornsea, abundant on the sand hills and cliffs, July, 1859 (*W.K.B.*); Spurn, Sept. (*W.C.H.*).

2. N.E.—Scarborough (*R.L.*); Redcar (*Baker Hudson*).

Calathus melanocephalus L. Very common and general.

1. S.E.—Bridlington (*W.C.H.*).

2. N.E.—Scarborough (*R.L.* and *W.K.B.*); Redcar (*W.C.H.*).

3. N.W. — Leyburn (*W.C.H.*); Studley (*E.A.W.*); Richmond (*W.C.H.*); Clapham, Ingleton (*J. W. Carter*).

4. Central.—York district, in profusion (*W.C.H.*).

5. S.W.—Leeds (*W.D.R.*); Wakefield (*E.B.W.*); Bradford district, common (*J. W. Carter*).

Calathus melanocephalus var. **nubigena** Hal.

3. N.W.—Ingleborough, 1884 and 1886 (*J. W. Carter*).

Calathus piceus Marsh. Locally abundant.

2. N.E.—Found in great profusion near Castle Howard (*Wm. Spence*, Feb. 1810); Helmsley, June, 1858 (*W.K.B.*).

3. N.W.—Studley (*E.A.W.*).

4. Central.—York (*A.* and *M. Solomon*).

5. S.W.—Saltaire (*J. W. Carter*).

Taphria nivalis Marsh.

1. S.E.—Hornsea Mere, July, 1859 (*W.K.B.*).

2. N.E.—Helmsley, July, 1858 (*W.K.B.*).

4. Central.—Askham Bryan, March, 1830 (*A. Wright*, vide *Loudon's Mag. N. H.*, 1831).

Anchomenus junceus Scop. Plentiful and general during almost the whole year.

2. N.E.—Scarborough (*W.K.B.*).

3. N.W.—Studley (*E.A.W.*); Richmond; Leyburn (*W.C.H.*).

4. Central.—York district, plentiful (*W.C.H.*); Selby (*W.C.H.*).

5. S.W.—Halifax (*S. Gibson*); Walton, Hebden Bridge, Askern, Rivelin Valley (*E.B.W.*); Bradford district, common (*J. W. Carter*).

Anchomenus dorsalis Müll. (=**prasinus** Thun.). A very common species. It is gregarious; I have sometimes met with as many as a dozen under a single stone. A dwarf variety is recorded from Glaisdale by Mr. H. Crowther (vide *Nat.*, Jan., 1879).

2. N.E.—Scarborough (*W.K.B.* and *R.L.*); Glaisdale (*H. Crowther*); Guisborough (*W.C.H.*).

3. N.W.—Studley (*E.A. W.*); Pannal (*W.D.R.*); Clapham (*J. W. Carter*).

4. CENTRAL.—York, common; Strensall, Selby (*W.C.H.*) Pontefract (*H. Crowther*); Wetherby (*E.B.W.*).

5. S.W.—Wakefield, Doncaster, Hebden Bridge, Rivelin Valley, &c. (*E.B.W.*); Mirfield (*E. Howgate*); Bradford district, abundant (*J. W. Carter*).

Anchomenus albipes F. Found in profusion by the banks of rivers, &c., both in spring and autumn.

1. S.E.—Brough (*E.B.W.*).

2. N.E.—Scarborough (*W.K.B.*, &c.); Guisborough (*W.C.H.*); Robin Hood's Bay (*H. Crowther*); Sleights, Danby, Castleton (*H. Pollard*).

3. N.W.—Studley (*E.A. W.*); Leyburn and Richmond (*W.C.H.*); Masham (*H. Pollard*); Clapham and Ingleton (*J. W. Carter*).

4. CENTRAL.—York, Selby, Cattal, and Boroughbridge (*W.C.H.*).

5. S.W.—Mirfield (*E. Howgate*); Wakefield; Wharncliffe (*E.B.W.*); Bradford district, abundant (*J. W. Carter*).

Anchomenus oblongus F. More records would be satisfactory.

4. CENTRAL.—Askham Bryan, 1830 (*A. Wright*, vide *Loudon's Magazine*, 1831).

5. S.W.—Chevet Lane, near Wakefield (*E.B.W.*).

Anchomenus marginatus L. There is only one record of the capture of this well-marked species in Yorkshire, viz.:

2. N.E.—Scarborough, Jan., 1839, 'taken in the immediate neighbourhood' (*W.K.B.*).

Anchomenus sexpunctatus L. It is difficult to say whether the following paragraph establishes the occurrence of this species near York or not: 'York has several active collectors, from whom I procured some valuable species

taken during the preceding season, including *Agonum sexpunctatum*.' (*A. H. Davis, Ent. Notes for 1831, Loudon's Mag.*, 1832).

Anchomenus ericeti Pz. Dawson, in his Geodephaga Britannica, gives Hebden Bridge and Luddenden Foot as localities for this species.

Anchomenus parumpunctatus F. Common and general.

1. S.E.—Bridlington, May (*W.C.H.*).

2. N.E.—Scarborough (*W.K.B.*); Scalby (*W.C.H.*); Filey (*W.C.H.*).

3. N.W.—Ilkley (*E.B.W.*); Studley (*E.A. W.*).

4. CENTRAL.—York district, abundant (*W.C.H.*); Selby (*W.C.H.*); Pontefract (*E.B. W.*).

5. S.W.—Wakefield (*E.B. W.*); Bradford district, common (*J. W. Carter*).

Anchomenus gracilipes Duft. Mr. Bissill took an insect at Hornsea, at the base of the cliff, under some dead thistles, which is believed to have belonged to this species. It was unfortunately lost in the post. (Vide *Ent. Ann.*, 1860, pp. 96—98, also *Zoologist* for 1859, xvii., 6698).

Anchomenus viduus Pz. var. mœstus Duft. It is doubtful whether the species occurs in Yorkshire. The variety is not scarce.

1. S.E.—Hornsea Mere, July, 1859 (*W.K.B.*).

2. N.E.—Scarborough, Jan. and Feb., 1859 (*W.K.B.*).

4. CENTRAL.—York and Selby (*W.C.H.*).

Anchomenus micans Nic. Local; sometimes plentiful.

2. N.E.—Scarborough, March and July (*W.K.B.*).

3. N.W.—Leyburn, in abundance under dead leaves in a wet wood in May (*W.C.H.*).

4. CENTRAL.—York, not rare (*W.C.H.*).

Anchomenus piceus L.

1. S.E.—Hornsea Mere, July, 1859, abundant (*W.K.B.*).

Anchomenus gracilis Gyll.

2. N.E.—Scarborough (*W. K. Bissill*, who writes, 'I

have taken several specimens of this insect in company with *A. pelidnus*, under bark of prostrate fir trees in Raincliff Wood').

Anchomenus fuliginosus Pz. Not uncommon.

2. N.E.—Scarborough (*W.K.B.* and *R.L.*).

3. N.W.—Studley (*E.A.W.*).

4. CENTRAL.—Askham, Jan. and Nov. (*W. Hey* and *A. Wright*).

5. S.W.—Sandal Castle Hill, near Wakefield (*E.B.W.*); Bradford district (*J. W. Carter*).

Anchomenus puellus Dej. Very local.

2. S.E.—Hornsea Mere, sixty specimens, July, 1859 (*W.K.B.*).

3. N.E.—Scarborough, Raincliff Wood, under the bark of prostrate firs, in company with *A. gracilis* (*W.K.B.*).

Anchomenus thoreyi Dj.

4. N.W.—Studley (*E.A.W.*).

Olisthopus rotundatus Payk. We have never met with this species in the York district, thoroughly as it has been searched, but it seems well distributed both east and west of it.

2. N.E.—Robin Hood's Bay, Sep. (*Henry Crowther*); Filey (*W.W.F.*).

3. N.W.—Studley (*E.A.W.*); Rombald's Moor, common (*J. W. Carter*).

5. S.W. — Wakefield district and Hebden Bridge (*E.B.W.*); Midgley Moor, Halifax, common, 1828 (*S. Gibson* in *Steph. Ill.*); Bradford district, one (*J. W. Carter*).

LEBIINA.

Lebia cyanocephala L. This species has been taken at any rate on the borders of the county, 'near Darlington,' rather plentifully, in March, 1828 (*J. O. Backhouse*, vide *Steph. Ill.*, June 30, 1828, i., 177).

Lebia chlorocephala Hoff. Well distributed, but not common.

1. S.E.—Brough (*E.B. W.*).

2. N.E.—Scarborough (*W.K.B.* and *R.L.*); Skelton (*E.B. W.*).

3. N.W.—Studley (*E.A. W.*).

4. Central.—York (*W.C.H.*).

5. S.W.—Walton (*E.B. W.*).

Demetrias monostigma Leach.

5. S.W.—Castleford and Walton (*E.B. W.*).

Demetrias atricapillus L. Tolerably plentiful.

1. S.E.—Brough (*E.B. W.*).

2. N.E.—Scarborough (*R.L.*).

3. N.W.—Studley (*E.A. W.*).

4. Central. — York district (*W.C.H.*); Pontefract (*E.B. W.*).

5. S.W.—Wakefield district (*E.B. W.*).

Dromius linearis Ol. General and moderately common.

2. N.E.—Scarborough (*W.K.B.* and *R.L.*); Filey (*W. W.F.*).

3. N.W.—Studley (*E.A. W.*).

4. Central.—York, Selby (*W.C.H.*).

5. S.W.—St. Swithin's Wood and Walton near Wakefield (*E.B. W.*).

Dromius meridionalis Dj. Only once recorded.

3. N.W.—Studley (*E.A. W.*).

Dromius agilis F. Also scarce.

2. N.E.—Scarborough (*W.K.B.*).

3. N.W.—Ilkley (*E.B. W.*).

Dromius quadrimaculatus L. Our commonest species of the genus. I have often beaten it out of beech trees, and Mr. Waterhouse states that it is very abundant in Yorkshire under the loose bark.

2. N.E.—Scarborough (*W.K.B.*).

3. N.W.—Studley (*E.A. W.*); Ilkley (*E.B. W.*).

4. Central.—York, Strensall (*W.C.H.*).

5. S.W.—Saltaire (*J. W. Carter*).

Dromius quadrinotatus Pz.

1. S.E.—Bridlington (*E.B.W.*).

2. N.E.—Scarborough (*W.K.B.*); Skelton (*E.B.W.*).

3. N.W.—Studley (*E.A.W.*).

4. CENTRAL.—Langton Wood, 1827, spring (vide *Steph. Ill.*, June 1, 1827, i., 22); Askham Bryan, 1830 (*A. Wright*).

Dromius nigriventris Thoms.

2. N.E.—Scarborough, South Cliff (*W. Hey*). Whitby Sand-banks, Sep., 1845 (*T. J. Bold, Zool.*, 1846). Query: Can Whitby be a misprint for Whitley in Northumberland?

Dromius sigma Ross. Local and scarce.

2. N.E.—Scarborough (*R.L.*).

4. CENTRAL.—Askham Bryan, 1830 (*A. Wright*).

Dromius melanocephalus Dej. Plentiful and probably general.

3. N.W.—Studley (*E.A.W.*).

4. CENTRAL.—Strensall, Clifton (*W.C.H.*); Askham (*A. Wright*).

5. S.W.—Wakefield district (*E.B.W.*).

Lionychus quadrillum Duft.

2. N.E.—Raincliff Wood, near Scarborough, at roots of ash (*R.L.*).

Cymindis vaporariorum L. Very local and scarce.

2. N.E.—Shores of Tees, April, 1828, six specimens (*L. Rudd*).

5. S.W.—Midgley Moor, near Halifax, 1829 (*S. Gibson*; vide *Steph. Ill.*, Feb., 1835, and Entomol. Notes for 1831 in *Loudon's Mag. N. H.*, 1832).

Broscus cephalotes L. An abundant species on the coast. It has been taken also in sandy places at a distance from the sea, though very occasionally; but it is most difficult to assent to the locality of 'Askham Bog,' given for it in *Loudon's Mag. N. H.*, 1831.

1. S.E.—Spurn, in great quantities in Sep., 1884 (*W.C.H.*); Hornsea (*W.K.B.*); Bridlington (*W.C.H.*); Hull (*A. H. Haworth*).

2. N.E.—Saltburn and Skelton (*E.B.W.*); Redcar (*W.C.H.*); Scarborough (*R.L.*).

4. CENTRAL.—Askham Bog (!) (*A. Wright*).

Miscodera arctica Payk. Local and scarce.

2. N.E.—Commondale Moor, near Guisborough (?) (*E.B.W.*); Eastern Moors (*S. Gibson*, *Steph. Ill.*, Feb., 28, 1835).

3. N.W.—Rombald's Moor, extremely scarce and local. Four in 1884 and one in 1886 (*J. W. Carter*).

5. S.W.—Halifax district, taken under small stones embedded in mounds of sand and moss on Coldedge, by the Rev. J. B. Reade (*Curtis*, *B. Ent.*, 1831, vii., 346); Midgley Moor, 1839 (*S. Gibson*).

CHLÆNIINA.

Chlænius vestitus Payk. This handsome insect only turns up very occasionally, and its distribution seems curiously vague.

3. N.W.—Studley (*E.A.W.*).

4. CENTRAL.—Clifton Scope, York, 1842, in March (*W. Hey*). Looked for in vain in after years.

5. S.W.—Wentbridge (*E.B.W.*).

Chlænius nigricornis Fab. More frequent than the former species, especially near York, but far from common.

1. S.E.—Hornsea Mere, August, 1859 (*W.K.B.*).

2. N.E.—Scarborough (*R.L.*).

4. CENTRAL.—Askham, 1830 (*A. Wright*); Fulford Ings, a pair, Nov., 1880 (*Jno. Smedley*); Strensall Common, on many occasions (*W. Hey*).

Chlænius holosericeus Fab. One of the species which has made Hornsea famous among Coleopterists. It was taken here early in this century, and Dawson says 'three

examples were taken there more recently [than 1826] by Mr. Grimston, during a flood.' (*Geod. Brit.*, 1854, p. 66).

1. S.E.—Hornsea (*Mr. Grimston*).

Oödes helopioides Fab. This species appears to be confined to two localities in Yorkshire, and is only too likely to become extinct.

1. S.E.—Hornsea Mere, ten specimens, in 1856 (*W.K.B.*).

4. CENTRAL.—Askham Bog, taken occasionally in wet moss by the pond sides, but I think less and less frequently (W.C.H.).

HARPALINA.

Harpalus rupicola Sturm. The records for the genus *Harpalus* are very meagre. Perhaps confusion of nomenclature and difficulty of identification has something to do with this.

1. S.E.—Brough (*E.B.W.*).

Harpalus puncticollis Payk.

2. N.E.—Filey, Aug. 1878 (*W.W.F.*), on blossoms of knapweed in seed, feeding like *Zabrus*.

Harpalus rufibarbis F. This is a frequent species at York at the bottom of haystacks, and in the flood-refuse of the Ouse. The specimens have been named by the Rev. W. W. Fowler.

4. CENTRAL.—York (*W.C.H.*).

Harpalus ruficornis F. Very common in some localities, less so about York.

1. S.E.—Flamborough Head, in abundance (*W.C.H.*).

2. N.E.—Scarborough (*R.L.*); Redcar (*Baker Hudson*).

3. N.W.—Studley (*E.A.W.*).

4. CENTRAL.—Copmanthorpe, Strensall, Selby, Boroughbridge (*W.C.H.*).

5. S.W.—Wakefield (*E.B.W.*); Mirfield (*E. Howgate*); Bradford district, common (*J. W. Carter*).

Harpalus proteus Payk. Common and general.

2. N.E.—Scarborough (*W.K.B.*); Redcar (*B. Hudson*).

3. N.W.—Richmond (*W.C.H.*); Studley (*E.A.W.*); Rombald's Moor (*J. W. Carter*).

4. CENTRAL.—York, particularly abundant in some old gravel pits (*W.C.H.*).

5. S.W.—Wakefield (*E.B. W.*); Bradford district (*J. W. Carter*).

Harpalus rubripes Duft.

2. N.E.—Whitby (*H. Pollard*, *Nat.*, Sep., 1879).

Harpalus latus L.

2. N.E.—Scarborough (*R.L.*).

3. N.W.—Rombald's Moor, 1885 and 1886 (*J. W. Carter*).

5. S.W.—Saltaire (*J. W. Carter*).

Harpalus calceatus Sturm. This insect was captured at Bridlington by the Rev. W. W. Fowler, in August, 1879. A single specimen only, and, so far, the second taken in Britain. It was at first taken to be *Harpalus tenebrosus* Dej.

1. S.E.—Bridlington (*W. W.F.*).

Harpalus neglectus Dej.

5. S.W.—Near Saltaire, one, 1886 (*J. W. Carter*).

Acupalpus meridianus L. Only taken sparingly.

2. N.E.—Banks of the Tees (*L. Rudd*).

3. N.W.—Studley (*E.A. W.*).

4. CENTRAL.—Fulford Gravel Pits (*W. Hey*).

5. S.W.—Midgley Moss, near Halifax (*S. Gibson*).

Bradycellus placidus Gyll. Locally abundant.

2. N.E.—Tees Banks (*Steph. Man.*, 1839, p. 50).

3. N.W.—Studley (*E.A. W.*).

4. CENTRAL.—Askham Bog, in wet moss in profusion, Sep., 1882 (*W.C.H.*); Strensall, May, 1885 (*W.C.H.*).

Bradycellus cognatus Gyll. Another of the Midgley Moor specialities. It does not seem to have been recorded from any other locality in Yorkshire.

3. N.W.—Rombald's Moor, one, 1886 (*J. W. Carter*).

4. S.W.—Midgley Moor (*Dawson*, *Geod. Brit.*, p. 163).

Bradycellus verbasci Duft. The most generally distributed species of the genus.

1. S.E.—Brough (*E. B. Wrigglesworth*).

2. N.E.—Scarborough (*W. K. Bissill*).

3. N.W.—Studley (*E. A. Waterhouse*).

4. CENTRAL.—York (*W.C.H.*).

5. S.W.—Bradford district, frequent (*J. W. Carter*).

Bradycellus collaris Payk. Inserted here on the authority of Dawson, who gives the 'high moors' in Yorkshire as a locality for this species (*Geod. Brit.*, p. 165).

Bradycellus harpalinus Dej.

3. N.W.—Rombald's Moor, common (*J. W. Carter*).

Bradycellus similis Dej.

2. N.E.—Scarborough, Feb. 1859 (*W. K. Bissill*).

3. N.W.—Rombald's Moor (*J. W. Carter*).

Dichirotrichus pubescens Payk.

1. S.E.—Brough (*E. B. Wrigglesworth*).

2. N.E.—Tees Banks, 1828 (*L. Rudd*).

Anisodactylus binotatus F. Probably not so scarce as the paucity of records seems to indicate.

2. N.E.—Scarborough (*W. K. Bissill*).

4. CENTRAL.—York district (*W. Hey*).

HYDRADEPHAGA.

HALIPLIDÆ.

Haliplus obliquus F.—Generally distributed, if not exactly abundant. Though sometimes found in stagnant ponds, its more usual habitat is clear running water.

1. S.E.—Brough (*E. B. W.*); Beverley, June (*W.C.H.*).

2. N.E.—Scarborough (*R. Lawson*); Coatham Marsh (*W.C.H.*); Marton (*L. Rudd*).

3. N.W.—Leyburn, in the Ure (*W.C.H.*).

4. CENTRAL.—Askham Bog (*H. Hutchinson*); Copman-

thorpe (*W.C.H.*); Foston (*W. Hey*).

5. S.W.—Heath and Walton (*E. B. Wrigglesworth*).

Haliplus fulvus F. This is a local species, and not plentiful.

2. N.E.—Marton (*Steph., Man.*, p. 63).

4. CENTRAL.—Strensall; Selby (*W.C.H.*).

5. S.W.—Wakefield district (*E. B. Wrigglesworth*).

Haliplus flavicollis Sturm. Probably more generally distributed than the records indicate.

1. S.E.—Beverley, in the R. Hull, June (*W.C.H.*).

4. CENTRAL.—Askham Bog (*H. Hutchinson*).

5. S.W.—Heath Common (*E. B. Wrigglesworth*).

Haliplus cinereus Aubé. This species appears to have been only taken in the York district, and very rarely there.

4. CENTRAL.—Askham Bog (*W. Hey*).

Haliplus fluviatilis Aubé. This scarce species has probably only been taken in one Yorkshire locality.

5. S.W.—Hebden Bridge, 1835 (*Curtis, B. Ent.*, 1835, xii., 531).

Haliplus ruficollis DG. Perhaps the most ubiquitous of the Hydradephaga, found abundantly in ponds in all parts of Yorkshire throughout the year.

1. S.E.—Bridlington (*W.C.H.*); Driffield (*W.C.H.*).

2. N.E.—Scarborough (*W.C.H.*); Redcar (*W.C.H.*); Gormire (*W.C.H.*).

3. N.W.—Studley (*E. A. Waterhouse*).

4. CENTRAL.—Throughout the district (*W.C.H.*).

5. S.W.—Hebden Bridge (*S. Gibson*).

Haliplus lineatocollis Marsh. Rather a local species, or perhaps often overlooked.

1. S.E.—Beverley (*W.C.H.*); Brough (*E. B. Wrigglesworth*; Bridlington (*W.C.H.*).

3. N.W.—Studley (*E. A. Waterhouse*).

4. CENTRAL.—York (*Steph., Man.*, 1839, p. 63); Selby (*W.C.H.*).

Brychius elevatus Panz. Frequent in clear gravelly streams.

1. S.E.—Beverley, in the R. Hull (*W.C.H.*).

2. N.E.—Scarborough (*R. Lawson*).

5. S.W.—Hebden Bridge Watercourse (*S. Gibson* in *Loudon's Mag.*, 1832); Wakefield district and Mirfield (*E. B. Wrigglesworth*).

DYTISCIDÆ.

HYDROPORINA.

Hyphydrus ovatus L. This is a very abundant insect in the central and eastern parts of the county, and I am surprised not to have met with a single record of its capture in the South-West.

1. S.E.—Market Weighton (*W.C.H.*).

2. N.E.—Scarborough (*R. Lawson*); Marton, 'common, the males in the proportion of five to one' (*L. Rudd* in *Steph., Ill.*, June 15th, 1829).

3. N.W.—Studley (*E. A. Waterhouse*).

4. CENTRAL.—Askham Bog, in profusion, and in other places round York (*W.C.H.*).

Hydroporus reticulatus F. A local species, abundant where it occurs.

2. N.E.—Scarborough (*R. Lawson*).

4. CENTRAL.—Abundant in a pond two miles north of York (*W.C.H.*); River Foss, April (*H. Hutchinson*); Selby (*W.C.H.*).

5. S.W.—Wakefield district (*E. B. Wrigglesworth*).

Hydroporus inæqualis F. Fairly well distributed, and sometimes abundant.

2. N.E.—Scarborough (*R. Lawson*); Marton, scarce (*L. Rudd*, *Steph., Ill.*, June 15th, 1827); Gormire (*W.C.H.*).

4. CENTRAL.—Askham Bog, very abundant in spring (*W.C.H.*); Strensall and Selby (*W.C.H.*).

5. S.W.—Meanwood Valley, near the Seven Arches (*H. Hewetson*); Wakefield and Castleford (*E.B.W.*).

Hydroporus decoratus Gyll. One of the many rarities found in Askham Bog, where it sometimes swarms in the spring. The earliest date at which I have taken it is March 9th. In April it is in profusion, but becomes scarcer in May. A second brood usually appears in autumn, and is met with freely about September 12th. This beautiful insect occurs in several of the ponds, but most profusely in a shallow moss-grown swamp, over-grown with *Iris* and *Typha*. Though most abundant in spring and autumn, a few specimens may be obtained in almost any month in the year (rather an unusual circumstance in the case of the *Hydradephaga*) especially when heavy rains have produced a flooding of the low ground.

4. CENTRAL.—Askham Bog, 1834, taken by G. A. Wright, from shallow puddles in the over-flowed part of the bog, July (*Curtis*, *B. Ent.*, 1835, xii. 531). N.B.—The remark about its being confined to such parts of the bog is quite groundless. References to its capture at Askham Bog may also be found in *Steph.*, *Ill.*, March 31st, 1835, v. 391 (*Rev. J. D. J. Preston*); *Zool.*, 1855, xiii. 4857 (*Rev. Hamlet Clark*); *Newman's Ent.*, October, 1842, i. 400 (*R. Cook*); *Zool.*, 1857, xv. 5411 (*Wm. Hey*, November 4th, 1856); *E. M. M.*, June 1872, ix. 12 (*H. Hutchinson*, April, 1872); *Friends' Nat. H. J.*, October 15th, 1880, iv. 117 (*W.C.H.*).

5. S.W.—Pontefract, April 2nd, 1877; named by H. Crowther (*Nat.*, 1877, ii. 160). This must surely be wrong.

Hydroporus picipes F (=*impresso-punctatus* Schall.). Very local and scarce.

2. N.E.—Coatham Marsh, a single example taken in March 1887 (*W.C.H.*).

4. CENTRAL.—Askham Bog, a single example taken in 1856 (*W. Hey*).

Hydroporus geminus F. There is only one Yorkshire record for this southern species.

5. S.W.—Hebden Bridge Watercourse, 1831 (*Sam. Gibson*; see *Loudon's Mag. N. H.*, 1832, v. 555).

Hydroporus pictus F. This little gem is abundant in ditches and ponds in many localities, especially so round York.

1. S.E.—Beverley (*W.C.H.*); Brough (*E.B.W.*).

2. N.E.—Scarborough (*R. Lawson*); Coatham (*W.C.H.*); Marton (*L. Rudd*).

4. CENTRAL. — York, Haxby, Copmanthorpe, Selby (*W.C.H.*).

5. S.W.—Nostell, Royston (*E. B. Wrigglesworth*).

Hydroporus granularis L. Another of the local species found in that portion of Askham Bog known as Chandler's Whin. Their haunt is some very old brickpits. This species appears as early as March 18th (see *E. M. M.*, May 1868, iv. 283).

4. CENTRAL.—Askham Bog (*W. Hey, Zool.*, 1857, xv. 7411; also *H. Hutchinson, E. M. M.*, June 1872, ix. 12). Very abundant there in April (*W.C.H.*).

Hydroporus lepidus Ol. A species almost certain to be more widely found, as investigations increase.

1. S.E.—Beverley (*W.C.H.*).

Hydroporus rivalis Gyll. Appears to be very scarce, according to my experience.

1. S.E.—Driffield, October, 1887 (*W.C.H.*).

3. N.W.—Ilkley (*E. B. Wrigglesworth*).

Hydroporus septentrionalis Gyll. Very local.

2. N.E.—Scarborough (*R. Lawson*).

3. N.W.—Studley (*E. A. Waterhouse*, 1879).

Hydroporus davisii Curt. This species was first taken in Britain 'in a millstream at Hebden Bridge in the spring' by Mr. A. H. Davis, F.L.S., after whom it was named by Curtis (vide *Curtis, Brit. Ent.*, 1831, viii. 343). It was taken again in the next year (1832) in the same locality by Mr. Sam. Gibson (vide *Loudon's Mag.*, 1832, p. 555;

vide etiam *Steph., Ill.*, March 31st, 1835, p. 392, and *Curtis, Zool.*, 1855, xiii. 4920-4921).

5. S.W.—Hebden Bridge (*Davis* and *Gibson*).

Hydroporus latus Steph. Local and scarce

2. N.E.—Marton Lodge, Yorkshire (*L. Rudd*; vide *Steph., Ill.*, June 15th, 1829, ii. 192).

5. S.W.—Hebden Bridge, 1831 (*S. Gibson*; vide *Loudon's Mag. N. H.*, 1832, v. 555; and *Curtis, Brit. Ent.*, 1831).

Hydroporus duodecimpustulatus Ol. Far from general or abundant. It has never turned up in many of the best investigated districts.

1. S.E.—Driffield, October 1887 (*W.C.H.*).

2. N.E.—Scalby (*R. Lawson*).

3. N.W.—Wetherby (*H. Crowther*, *Nat.*, June 1877, ii. 176).

5. S.W.—Near Wakefield (*E.B.W.*, 1879).

Hydroporus depressus F. Locally abundant.

1. S.E.—Driffield, October 1887 (*W.C.H.*).

2. N.E.—Scarborough (*R. Lawson*); Marton, 'common' (*L. Rudd*, 1829); Coatham, September 1882 (*W.C.H.*).

4. CENTRAL.—River Foss at Strensall, May (*W.C.H.*).

5. S.W.—Hebden Bridge Watercourse, 1831 (*S. Gibson*, in *Loudon's Mag. N. H.*, 1832, v. 555).

Hydroporus assimilis Payk. Plentiful about York, and probably further investigation will prove it to be much more general than at present has been ascertained.

1. S.E.—Beverley, June 1882 (*W.C.H.*).

2. N.E.—Scarborough (*R. Lawson*).

4. CENTRAL.—York, September (*W.C.H.*); Selby, May (*W.C.H.*).

Hydroporus dorsalis F. A somewhat local insect, not uncommon round York.

1. S.E.—Brough (*E. B. Wrigglesworth*).

2. N.E.—Coatham (*Baker Hudson*).

4. CENTRAL.—Ponds north of York (*W.C.H.*); Askham Bog (*W.C.H.*); (vide etiam *E. M. M.*, June 1872, ix. 12, and *E. M. M.*, May 1868, iv. 283).

5. S.W.—Wakefield (*E. B. Wrigglesworth*).

Hydroporus oblongus Steph. This is one of the insects which swell the fame of Askham Bog, where it was first taken by the late Archdeacon Hey. References to its capture will be found in the *Zool.*, 1857, xv. 5411; *Entom. Annual*, 1866, p. 48; *E. M. M.*, June 1872, ix. 12, and May 1868, iv. 283.

It is a particularly early insect. I have taken it as early as February 11th. It is never abundant, but I once secured half a dozen specimens at a time. It becomes very scarce after the month of April. Its haunt is a shallow pool thickly moss-grown.

4. CENTRAL.—Askham Bog (*W. Hey*, *W. C. H.*, and *H. Hutchinson*).

Hydroporus memnonius Nic. Rather an uncommon insect.

1. S.E.—Brough (*E. B. Wrigglesworth*).

2. N.E.—Scarborough (*R. Lawson*).

4. CENTRAL.—Boroughbridge, August 1831, taken by T. C. Thompson (*C. C. Babington* in *Loudon's Mag. N. H.*, 1832, v. 328); many ponds about York (*W.C.H.*); Askham Bog, 1856 (*W. Hey*); and 1871 (*H. Hutchinson*).

5. S.W.—Hebden Bridge, 1831 (*Sam. Gibson*, in *Loudon's Mag. N. H.*, 1832, v. 555); Wakefield (*E.B. W.*).

Hydroporus obsoletus Aubé. Scarborough appears to be the only locality recorded for this species. Mr. Lawson (of that town) refers to an abnormal structure in the right antenna of a specimen taken there in April 1872 (vide *E. M. M.*, May 1872, viii. 288).

2. N.E.—Scarborough (*R. Lawson* and *W. Hey*).

Hydroporus gyllenhalii Schiödte. Very local, and nowhere abundant.

4. CENTRAL.—Askham Bog, 1856 (*W. Hey*, *Zool.*, 1857, xv. 5411, and *H. Hutchinson*, *E. M. M.*, June, 1872, ix., 12); Strensall, March 1885 (*W.C.H.*).

5. S.W.—With *H. tristis* in a small pond or tarn on Midgeley Moor near Hebden Bridge, July, 1852 (*T. V. Wollaston*, *Zool.*, 1855, xiii. 4655).

Hydroporus rufifrons Duft. Another of the Askham Bog rarities, and almost confined to it in Britain. Notices of its capture will be found in *Zool.*, 1857, xv. 5411, and in *E. M. M.*, May 1868, iv. 283; both written by the late Archdeacon Hey. Also mentioned in *E. M. M.*, June, 1872 (*H. Hutchinson*). This species affects shallow grassy pools which only exist during winter, and it sometimes appears in them in immense numbers. In September, 1881, during the visit of the British Association to York, I took some of the entomological members up to the bog, and they were greatly delighted by finding this scarce insect in great numbers in pools caused by the heavy rains which prevailed at that time. I found it all through that winter, but on March 9th, after heavy floods, it appeared in numbers almost incredible. It disappeared in May, and I have never taken it very plentifully since that year. It is generally in company with another scarce beetle, *Agabus uliginosus*.

4. CENTRAL.—Askham Bog (*W. Hey*, *W.C.H.*, *H.H.*).

Hydroporus erythrocephalus L. Very abundant in the York district, and probably elsewhere.

2. N.E.—Coatham and Marske (*W.C.H.*).

4. CENTRAL.—York (*W.C.H.*).

5. S.W.—Wakefield (*E. B. Wrigglesworth*).

Hydroporus lituratus F (=*xanthopus*, Steph.). Common in York district.

3. N.W.—Studley (*E. A. Waterhouse*, 1879).

4. CENTRAL.—York (*W.C.H.*); Askham Bog, 1871 (*H. Hutchinson*).

5. S.W.—Sandal, near Wakefield (*E. B. Wrigglesworth*).

Hyproporus planus F. One of the commonest species of the genus, inhabiting ponds in great plenty.

1. S.E.—Brough (*E. B. Wrigglesworth*).

2. N.E.—Scarborough (*E.B. W.*); Marske (*W.C.H.*).

3. N.W.—Studley (*E. A. Waterhouse*).

4. CENTRAL.—Common throughout the York district (*W.C.H.*).

5. S.W.—Wakefield, Hebden Bridge (*E.B. W.*).

Hydroporus melanocephalus Steph. (=*pubescens* Gyll.). Another very common species, though records are deficient.

3. N.W.—Studley (*E. A. Waterhouse*, 1879).

4. CENTRAL.—York (*W.C.H.*).

5. S.W.—Hebden Bridge Watercourse (*Sam. Gibson*, February 23, 1832).

Hydroporus nigrita F.

5. S.W.—Hebden Bridge Watercourse, 1831 (*S. Gibson* in *Loudon's Mag. N. H.*, 1832, v. 555).

Hydroporus melanarius Sturm.

4. CENTRAL.—Askham Bog (*H. Hutchinson*, April 1872, vide *E. M. M.*, June 1872, ix. 12).

Hydroporus atriceps Crotch (=*melanocephalus* Gyll.). This species is recorded by L. Rudd, from Yorkshire, without a more definite locality (*Steph., Ill.*, June 15th, 1829, ii. 193).

4. CENTRAL.—Askham Bog (*W. Hey, H. Hutchinson*).

Hydroporus tristis Payk.

4. CENTRAL.—Askham Bog, not common (*W. Hey*, 1856; *H. Hutchinson*, 1872).

5. S.W.—In a small pond or tarn on Midgeley Moor near Hebden Bridge, July 1852 (*T. V. Wollaston, Zool.* 1855, xiii. 4655.

Hydroporus neglectus Schaum. A very scarce and local species, only recorded in this county from the neighbourhood of York. In 1872, Archdeacon Hey and Mr. H. Hutchinson took it abundantly in a pond near Strensall Common. It also occurs sparingly at Askham Bog.

4. CENTRAL.—Strensall Common (*W. Hey* and *H. Hutchinson*); Askham Bog, March 1882 (*W.C.H.*).

Hydroporus umbrosus Gyll.

4. CENTRAL.—Askham Bog, 1856 (*W. Hey*); and 1871 (*H. Hutchinson*); also recorded as taken on March 18th, 1868, in the same locality (*W. Hey*, *E. M. M.*, May 1868, iv. 283); Strensall, 1882 (*W.C.H.*).

Hydroporus obscurus Sturm.

4. CENTRAL.—Askham Bog, 1856 (*W. Hey*); and 1871 (*H. Hutchinson*).

Hydroporus vittula Er.

4. CENTRAL.—Askham Bog (*W. Hey* and *H.H.*, 1871).

Hydroporus palustris L. This is unquestionably the commonest species of the genus in Yorkshire, abounding even in the most temporary puddles, and throughout the year.

1. S.E.—Brough (*E.B.W.*); Bridlington (*W.C.H.*).

2. N.E.—Scarborough, Marske, Coatham (*W.C.H.*); Gormire (*W.C.H.*).

3. N.W.—Studley (*E. A. Waterhouse*).

4. CENTRAL.—York (*W. Hey*); Strensall, Sheriff Hutton (*W.C.H.*).

5. S.W.—Wakefield district (*E. B. Wrigglesworth*).

Hydroporus angustatus Sturm. Local, but common near York.

4. CENTRAL.—Strensall (*W.C.H.*); Askham Bog, 1856 and 1868 (*W. Hey*); and 1871 (*H. Hutchinson*).

Hydroporus scalesianus Steph. This species was only known as British by a single specimen in Stephens' cabinet (said to have been taken by Mr. Scales, near Swaffham, in Norfolk) until rediscovered by the late Archdeacon Hey at Askham Bog in the year 1856 (see *Zool.*, 1856, xiv. 5178). A single spot in Askham Bog is still the only known British habitat of this species. It frequents the mossy margin of a shallow pond and may be taken in some numbers in the

early spring at that particular locality. I have taken it as early as February.

4. CENTRAL.—Askham Bog, 1856 and 1868 (*W. Hey*); also in 1871 and 1880-1886 (*W.C.H.*).

Hydroporus lineatus F. Tolerably common and general.

2. N.E.—Marton Lodge (*L. Rudd, Steph., Ill.*, June 15th, 1829, ii. 193); Scarborough (*R. Lawson*).

3. N.W.—Studley (*E. A. Waterhouse*).

4. CENTRAL.—York district generally (*W.C.H.*).

5. S.W.—Hebden Bridge, 1831 (*S. Gibson*); Wakefield district, 1879 (*E. B. Wrigglesworth*).

COLYMBETINA.

Noterus clavicornis DG. Askham Bog seems to be the northern limit of this species. It is abundant there even in January.

4. CENTRAL.—Askham Bog (*A. Wright*, Nov. 1830; *W. Hey*; *W.C.H.*).

Laccophilus minutus L. Locally abundant.

1. N.E.—Marton, common (*L. Rudd, Steph., Ill.*, 1829).

3. N.W.—Studley (*E. A. Waterhouse*, 1879).

4. CENTRAL.—Askham Bog (*W.C.H.*).

5. S.W.—Wakefield (*E. B. Wrigglesworth*).

Laccophilus hyalinus DG. (=*obscurus* Panz.).

1. S.E.—Brough (*E. B. Wrigglesworth*).

2. N.E.—Normanby in Cleveland, 1879 (*H. Pollard, Nat.*, Sept. 1879); Scarborough (*R. Lawson*).

4. CENTRAL.—R. Foss; ponds north of York (*W.C.H.*).

5. S.W.—Wakefield district (*E. B. Wrigglesworth*).

Colymbetes fuscus L. The largest and commonest of the genus.

1. S.E.—Brough (*E. B. Wrigglesworth*).

2. N.E.—Coatham (*W.C.H.*); Scarborough (*R. Lawson.*)

3. N.W.—Studley (*E. A. Waterhouse*).

4. CENTRAL.—York district; and Doncaster (*W.C.H.*).

5. S.W.—Wakefield district (*E. B. Wrigglesworth*).

Colymbetes grapii Gyll. This species has not been found in any Yorkshire locality but Askham Bog. There it is sometimes quite plentiful, especially in a very shallow moss-grown pond, or rather morass. Appears early in March.

4. CENTRAL.—Askham Bog (*W. Hey*; see *Zool.*, 1857, xv. 5410, and *E. M. M.*, May 1868). Also taken by *H. Hutchinson* and *W.C.H.*

Colymbetes pulverosus Steph.

4. CENTRAL. — Askham Bryan, 1830 (*A. Wright*, November 25th, 1830, in *Loudon's Mag.*, 1831, iv. 165). N.B.—This record has never been confirmed.

Colymbetes bistriatus Berg. Local.

2. N.E.—Marton, 1839 (*Steph., Man.*, 1839, p. 72).

4. CENTRAL.—Strensall, July 1883 (*W.C.H.*). The record from Askham Bog (*E. M. M.*, June 1872, ix. 12) can hardly be correct.

Colymbetes exoletus Forst. Locally abundant.

2. N.E.—Scarborough (*R. Lawson*).

4. CENTRAL.—Askham Bryan, 1830 (*A. Wright, Loudon's Mag. N. H.*, 1831, iv. 165). Also taken by Archdeacon Hey (*Zool.*, 1857) and H. Hutchinson (*E. M. M.*, 1872). It is still abundant in one pond (*W.C.H.*).

5. S.W.—Wakefield (*E. B. Wrigglesworth*).

Ilybius fenestratus F. Scarce and local.

2. N.E.—Gormire (*W.C.H.*).

4. CENTRAL.—Stamford Bridge (*Rev. W. W. Fowler*).

Ilybius fuliginosus F. A very abundant species, affecting small ditches and ponds.

1. S.E.—Driffield (*W.C.H.*).

2. N.E.—Coatham (*W.C.H.*); Scarborough (*R. Lawson*).

3. N.W.—Richmond (*W.C.H.*); Masham (*H. Pollard*, *Nat.*, 1879, v. 22).

4. CENTRAL.—York district, generally, in abundance (*W.C.H.*).

5. S.W.—Hebden Bridge, 1831 (*S. Gibson*); Wakefield (*E. B. Wrigglesworth*).

Ilybius ater DG. General and often plentiful.

2. N.E.—Whitby (*H. Crowther*).

3. N.W.—Studley (*E. A. Waterhouse*).

4. CENTRAL.—Askham Bog, Clifton Ings, Doncaster (*W.C.H.*).

5. S.W.—Wakefield (*E. B. Wrigglesworth*).

Ilybius obscurus Marsh. Locally abundant.

4. CENTRAL.—Askham Bog, in plenty, 1856 (*W. Hey*); still very abundant in the same place, 1886 (*W.C.H.*); Selby (*W.C.H.*).

Ilybius guttiger Gyll. Locally abundant.

4. CENTRAL.—Askham Bog, 1856 and 1868 (*W. Hey*); Strensall Common, 1885 (*W.C.H.*).

Liopterus agilis F. Very local. Abundant in Askham Bog.

2. N.E.—Marton, 1828, in pools on the hills near Marton Lodge, but very scarce (*L. Rudd, Steph., Ill.*, June 15th, 1829, ii. 194).

4. CENTRAL.—Askham, 1830 (*A. Wright*); also in 1856 and 1868 (*W. Hey*). Still very abundant in the same locality, 1887 (*W.C.H.*).

5. S.W.—Hebden Bridge Watercourse, 1831 (*S. Gibson, Loudon's Mag.*, 1832, v. 555).

Agabus bipustulatus L. One of the commonest and most generally distributed of our water-beetles, swarming in ponds and slow ditches throughout the year.

1. S.E.—Bridlington (*W.C.H.*).

2. N.E.—Coatham Marsh (*W.C.H.*); Scarborough (*R. Lawson*).

3. N.W.—Studley (*E. A. Waterhouse*).

4. CENTRAL.—York, Sheriff Hutton, &c. (*W.C.H.*).

5. S.W.—Wakefield (*E. B. Wrigglesworth*); Hebden Bridge (*S. Gibson*).

Agabus chalconotus Panz. Not uncommon.

4. CENTRAL.—York, Strensall (*W.C.H.*).

5. S.W.—Wakefield (*E.B.W.*); Hebden Bridge, 1831 (*S. Gibson*).

(?) **Agabus congener** Thun. A record from Askham Bog (*E. M. M.*, June 1872, ix. 12) is almost certainly erroneous.

Agabus sturmii Gyll. Common and general.

1. S.E.—Driffield (*W.C.H.*).

2. N.E.—Coatham Marsh, in abundance (*W.C.H.*); Scarborough (*R. Lawson*).

4. CENTRAL.—York, Selby, Doncaster, &c. (*W.C.H.*).

5. S.W.—Walton (*E.B.W.*); Hebden Bridge, 1831 (*S.G.*)

Agabus uliginosus L. It is not at all probable that any of the Yorkshire localities given for this species are correct except Askham Bog. There it occurs very irregularly; after heavy rains in autumn, it is occasionally very plentiful in the shallow floodings, but in the deeper ponds it is only now and then that a specimen turns up. It nearly always occurs in company with *Hydroporus rufifrons*, and with it is found throughout the winter months. The interesting dull form of the female (confined, I believe, to Britain) is frequent in Askham Bog.

4. CENTRAL.—Askham Bog, 1856 (*W. Hey, Zool.*, 1857, xv. 5411); also in 1868 (*W. Hey, E. M. M.*, May 1868, iv. 283; and in plenty in autumn, 1881 (*W.C.H.*).

Agabus paludosus F. Very local and apparently scarce. Archdeacon Hey spoke of it as not uncommon in Yorkshire in former years.

2. N.E.—Scarborough (*R. Lawson*).

4. CENTRAL.—Waterlane ditch, near York (*W.C.H.*); Askham Bog (*H. Hutchinson*).

Agabus nitidus F. (=*fontinalis* Steph. =*biguttatus* Ol.). Another scarce species. It has been recorded from Bluebank, near Sleights, 1879 (*H. Pollard, Nat.*, September, 1879, v. 20), but the record perhaps requires confirmation.

2. N.E.—Scarborough (*R. Lawson*).

5. S.W.—Hebden Bridge Watercourse, 1831 (*Sam. Gibson*, February 23rd, 1832, in *Loudon's Mag.*, 1832, v. 555).

Agabus guttatus Payk. Local. Inhabits clear running water. I have found it dead on the South Sands at Bridlington Quay in some numbers, in company with the next species. No doubt the insects were brought down by the clear streams, which enter the sea in that neighbourhood.

1. S.E.—Bridlington Quay (*W.C.H.*).

2. N.W.—Studley (*E. A. Waterhouse*).

Agabus didymus Ol. Local and not plentiful.

1. S.E.—Bridlington Quay (*W.C.H.*).

2. N.E.—Scarborough (*R. Lawson*).

4. CENTRAL.—York (*W.C.H.*); Askham Bog (*H.H.*).

Agabus nebulosus Forst. (=*bipunctatus F.*). General, though seldom very abundant.

1. S.E.—Brough (*E. B. Wrigglesworth*).

2. N.E.—Marton, 'not common' (*L. Rudd*); Coatham (*W.C.H.*).

3. N.W.—Studley (*E.A.W.*); Settle (*W.C.H.*).

4. CENTRAL.—York (*W.C.H.*)

5. S.W.—Hebden Bridge (*S. Gibson*); Wakefield (*E. B. Wrigglesworth*).

Agabus abbreviatus F. (=*undulatus* Schr.). This elegant species is another of the Askham Bog specialities, where it is abundant in May, and obtainable during most of the year. It has also found its way into the neighbouring brick-ponds on Hob Moor.

4. CENTRAL.—Askham Bog, 1830 (*A. Wright*, *Loudon's Mag.*, 1831, iv. 165); ditto, 1856 (*W. Hey*); (see also *E. M. M.*, May 1868, iv. 283). Hob Moor (*W.C.H.*)

Agabus unguicularis Thoms. Abundant in Askham Bog, but not found elsewhere in Yorkshire.

4. CENTRAL.—Askham Bog, perhaps the most abundant of the Hydradephaga there present (*W.C.H.*).

N.B.—*Agabus affinis* Payk. is recorded by Archdeacon Hey from Askham Bog (*Zool.*, 1857, xv. 5411). His remarks really belong to *Agabus unguicularis*. *A. affinis* has been only found in Britain near Dumfries.

Agabus femoralis Payk. Confined apparently to the York district.

4. CENTRAL.—Askham Bog (*H. Hutchinson*); Strensall Common, plentiful in 1882; perhaps extinct now in consequence of extended drainage (*W.C.H.*).

Agabus maculatus L. Generally distributed in suitable localities. This is one of the few species of *Agabus* which affect clear running water, and is consequently scarce in the plains.

1. S.E.—Beverley (*W.C.H.*).

2. N.E.—Scalby Beck (*R. Lawson*).

3. N.W.—Leyburn (*W.C.H.*); Streams west of Harrogate (*W. Hey*).

4. CENTRAL.—Boroughbridge (*W.C.H.*); Goldsborough (*W.C.H.*).

5. S.W.—Wakefield (*E. B. Wrigglesworth*); Hebden Bridge (*S. Gibson*).

DYTISCINA.

Dytiscus marginalis L. This tiger of our waters is common and general. It is one of the few species of the order which use their wings freely. Consequently it will sometimes appear suddenly in numbers in places where it was not known before. It is destructive to young fish, biting pieces out of them most ferociously.

2. N.E.—Scarborough (*R.L.*); Saltwick (*H. Crowther*).

3. N.W.—Studley (*E. A. Waterhouse*).

4. CENTRAL.—York (*W.C.H.*); Bishop Wood (*A. Denny*); Askern (*Lankester*, 1842); Doncaster (*W.E.C.*).

5. S.W.—Leeds (*W. H. Taylor*); West Riding generally (*E. B. Wrigglesworth*).

THE FLORA OF DEWSBURY AND NEIGHBOURHOOD.

P. FOX LEE,

Secretary for Phanerogamia
to the Botanical Section of the Yorkshire Naturalists' Union,
Member of the Botanical Record Club, etc.

The observations recorded here have, with the exception of those to which the names of brother botanists are appended, all been made by the writer during the past five or six years.

The geological formation does not favour many of the rarer plants, as the whole of the Dewsbury district embraced in this 'Flora' lies on the coal measures.

The list of Rubi does not profess to be a complete one. The writer has sent a great number of specimens for determination and confirmation to specialists, but as opinions have differed concerning some of them, only those species are inserted about which there seems to be no doubt.

The nomenclature is according to 'The Students' Flora of the British Islands,' by Sir J. D. Hooker, K.C.S.I., C.B., &c., third edition (1884); and the numbers which precede the Latin names refer to 'The London Catalogue of British Plants,' eighth edition (1886).

The writer has to thank Mr. J. G. Baker, F.R.S., F.L.S., of the Royal Herbarium, Kew, for kindly looking over the manuscript and for making several valuable suggestions.

The total number of species is nearly five hundred.

7. **Anemone nemorosa** L. Wood anemone. Abundant in woods.
12. **Ranunculus circinatus** Sibth. Coxley Dam.
14. **Ranunculus penicillatus** Dumort. Pond, Howley, Batley.

18c. **Ranunculus floribundus** Bab. Old brick-ponds, near Bretton.

21. **Ranunculus Lenormandi** Schultz. Mud crowfoot. Ditches, Chadwick Wood, Mirfield.

22. **Ranunculus hederaceus** L. Ivy-leaved crowfoot. Margin of pond, Carlinghow.

25. **Ranunculus Flammula** L. Lesser Spear-wort. Wet places, common.

28. **Ranunculus auricomus** L. Goldielocks. Woods and hedgebanks, uncommon.

29. **Ranunculus acris** L. Buttercup.

29c. **Ranunculus vulgatus** Jord. Coxley Valley.

30. **Ranunculus repens** L. Creeping buttercup. Very common.

31. **Ranunculus bulbosus** L. Bulbous buttercup. Grass land.

34. **Ranunculus arvensis** L. Corn crowfoot. Cornfields. Heybeck; Ravensthorpe.

36. **Ranunculus Ficaria** L. Pilewort. Moist places, &c.

37. **Caltha palustris** L. Marsh marigold. Coxley Valley; Bulrush Dam, Carlinghow.

43. **Aquilegia vulgaris** L. Columbine. One plant in a hedgerow, at Whitley, probably an escape.

54. **Papaver Rhœas** L. Common poppy. Cornfields.

62. **Chelidonium majus** L. Celandine. Several plants on a hedgebank, Horbury Bridge. Likely to be a garden escape (W. Rushforth).

65. **Corydalis claviculata** DC. North wood, Horbury, in abundance.

66b. **Fumaria capreolata** L. Rampant fumitory. Hartshead (Rev. W. Fowler, M.A.).

70. **Fumaria officinalis** L. Common fumitory. Waste places and cultivated land.

76. **Nasturtium officinale** Br. Watercress. Stream, Boothroyd; Coxley Valley.

78. **Nasturtium palustre** DC. Marsh yellow-cress. Calder bank, in great abundance.

80. **Barbarea vulgaris** Br. Yellow rocket. Calder and Canal banks.

82. **Barbarea stricta** Andrz. (Sub-sp.). Several plants on the banks of the river Calder. A rare form.

88. **Arabis hirsuta** Br. Hairy rock-cress. Scarce. Coxley Valley.

91. **Cardamine amara** L. Bitter-cress. Very rare, only on the margin of Coxley Dam.

92. **Cardamine pratensis** L. Cuckoo-flower. In moist meadows, but not plentiful. With double flowers, Coxley Valley.

93. **Cardamine hirsuta** L. Hairy bitter-cress. Frequent in waste moist places.

94. **Cardamine flexuosa** With. (Sub-sp.). Wood bitter-cress. Banks of stream, North Wood, Netherton.

104. **Erophila vulgaris** DC. Whitlow-grass. Elmley Wood-house (W. Rushforth).

110. **Cochlearia Armoracia** L. Horse radish. Calder bank, Thornhill Lees.

111. **Hesperis matronalis** L. Dame's Violet. Waste ground, Birkdale road. Most likely a garden outcast.

113. **Sisymbrium officinale** Scop. Hedge-mustard.

118. **Sisymbrium Alliaria** Scop. Jack-by-the-hedge. Hedge banks, not uncommon.

121. **Camelina sativa** Crantz. Gold of pleasure. One plant on an old wall, Horbury Bridge.

126A. **Brassica Rapa** var. **sativa** H. C. Wats. Waste ground.

129. **Brassica nigra** Koch. Black mustard. Spen Banks, Dewsbury Moor.

131. **Brassica Sinapis** Visiani. Charlock. Cornfields.

136. **Capsella Bursa-pastoris** Mœnch. Shepherd's purse.

141. **Lepidium sativum** L. Cress. A garden escape.

142. **Lepidium campestre** Br. Pepperwort. Sandy bank, Thornhill Lees.

143. **Lepidium Smithii** Hook. (sub-sp.). Smooth-fruited pepperwort. Sandy bank, Thornhill Lees.

154. **Raphanus Raphanistrum** L. Wild radish. Cornfields.

158. **Reseda Luteola** L. Dyer's weed. Waste ground, Horbury Bridge.

164. **Viola palustris** L. Marsh violet. Swamp, Soothill Wood.

165. **Viola odorata** L. Sweet violet. Copse, Netherton. The white variety occurs sparingly at Crigglestone (W. Rushforth).

167. **Viola sylvatica** Fries. Wood violet. Common on hedgebanks.

173. **Viola tricolor** L. Pansy. Damp waste ground.

174. **Viola arvensis** Murr. (sub-sp.) In cornfields.

177. **Polygala vulgaris** L. Milkwort. Coxley Valley, with white, pink and. blue flowers.

191. **Saponaria officinalis** L. Soapwort. Thornhill (W. Rushforth).

192. **Silene Cucubalus** Wibel. Bladder campion. Railway embankments, &c., very abundant. The downy var. **puberula**, is common in similar situations.

202. **Silene noctiflora** L. Night-flowering catch-fly. Turnip field, Netherton. A rare colonist.

204. **Lychnis vespertina** Sibth. White campion. Hedgerows.

205. **Lychnis diurna** Sibth. Red campion. Hedgerows.

206. **Lychnis Flos-cuculi** L. Ragged robin. Moist meadows.

209. **Githago segetum** Desf. Corn cockle. Cornfields.

215. **Cerastium glomeratum** Thuill. Clustered mouse-ear. Waysides and fields.

216. **Cerastium triviale** Link. Narrow-leaved mouse-ear. Fields, abundant.

223. **Stellaria media** Vill. Chickweed. The variety *neglecta* Weihe grows in North Wood.

225. **Stellaria Holostea** L. Stitchwort. Common on hedgebanks.

227. **Stellaria graminea** L. Grass-leaved stitchwort. Meadows.

228. **Stellaria uliginosa** Murr. Water stitchwort. Margin of Coxley Dam; ditch, Howley.

233. **Arenaria trinervia** L. Three-nerved sandwort. Moist hedgebanks.

234. **Arenaria serpyllifolia** L. Thyme-leaved sandwort. Dry places, Coxley Valley. Not common.

240. **Sagina apetala** L. Small-flowered Pearlwort. Wall top at Bretton Park.

242. **Sagina procumbens** L. Procumbent Pearlwort.

247. **Spergula arvensis** L. Corn spurrey. Cornfields.

248. **Spergularia rubra** Pers. Field sandwort-spurrey. Old lane, Stocks Moor.

253. **Claytonia alsinoides** Sims. Copse, near Morley.

255. **Montia fontana** L. Water blinks. Brook, Thornhill.

263. **Hypericum perforatum** L. Common St. John's wort. Canal bank.

264. **Hypericum tetrapterum** Fries. Square-stalked St. John's wort. Boggy ground, Coxley Valley.

267. **Hypericum humifusum** L. Creeping St. John's wort. Coxley Valley.

269. **Hypericum pulchrum** L. Beautiful St. John's wort.

277. **Malva moschata** L. Musk mallow. Meadow bank, Coxley Valley; Horbury Bridge. Uncommon.

278. **Malva sylvestris** L. Common Mallow. Waste ground, in but few places.

284. **Tilia vulgaris** Hayne. Lime tree. Woods and plantations.

287. **Linum catharticum** L. Purging flax. Dry fields.

290 **Linum usitatissimum** L. Common flax. Occasionally occurs in cornfields.

298. **Geranium molle** L. Dove's-foot. Pasture, Coxley Valley.

299. **Geranium pusillum** L. Small-flowered crane's-bill. Waste ground, Savile Town.

301. **Geranium dissectum** L. Jagged cranes-bill.

304. **Geranium Robertianum** L. Herb Robert.

305. **Erodium cicutarium** L'Herit. Stork's-bill. Waste ground, Batley (J. Neville).

308. **Oxalis Acetosella** L. Wood sorrel.

313. **Impatiens parviflora** DC. Stream, Bretton. A casual.

314. **Ilex Aquifolium** L. Holly.

318. **Acer Pseudoplatanus** L. Sycamore.

319. **Acer campestre** L. Maple. Hedges.

322. **Genista tinctoria** L. Dyer's greenweed. Abundant in an undrained field, Stocks Moor; Hungerhills.

323. **Ulex europæus** L. Furze. Whin. Waste ground.

324. **Ulex nanus** sub. sp. **Gallii** Planch. Dwarf Furze. Stocks Moor.

326. **Cytisus scoparius** Link. Broom. Woods and waste ground.

327A. **Ononis spinosa** sub-sp. **Ononis repens** L. Rest-harrow. Coxley Valley.

334. **Medicago lupulina** L. Black medick. Fields.

335. **Medicago denticulata** Sibth. Reticulated Medick. A rare casual. Manure-heap, Savile Town.

338. **Melilotus altissima** Thuill. Melilot.

339. **Melilotus alba** Desr. White melilot. Waste ground, Boothroyd.

341. **Melilotus parviflora** Lamk. Cultivated ground. Dewsbury Moor. A casual.

343] **Trifolium pratense** L. Red Clover.

344. **Trifolium medium** Huds. Meadow clover. Copse, Soothill. Not common.

347. **Trifolium incarnatum** L. Crimson clover. Margin of clover-field, Savile Town.

357. **Trifolium hybridum** L. Alsike clover. Fields, introduced with clover.

358. **Trifolium repens** L. White clover.

362. **Trifolium procumbens** L. Hop trefoil. Waste ground, not uncommon.

363. **Trifolium dubium** Sibth. Lesser yellow trefoil.

366. **Lotus corniculatus** L. Bird's-foot trefoil.

368. **Lotus uliginosus** Schk. Greater Bird's-foot trefoil. Moist places.

381. **Vicia hirsuta** Koch. Common tare. Hedgebanks.

384. **Vicia Cracca** L. Tufted vetch.

387. **Vicia sepium** L. Bush vetch.

391. **Vicia sativa** L. Common vetch. Dry bank, Stocks Moor.

392B. **Vicia angustifolia** var. **Vicia bobartii** Forst. Dry bank, Coxley Valley.

399. **Lathyrus pratensis** L. Meadow vetchling.

405. **Lathyrus macrorrhizus** Wimm. Tuberous Bitter vetch.

406½. **Scorpiurus vermiculatus.** European caterpillar-vetch. One plant in a garden, Batley. Would doubtless have come in waste woollen material, used as manure (J. A. Erskine Stuart).

407. **Prunus communis** Huds. Sloe. Crigglestone.

408. **Prunus insititia** L. (sub-sp.). Bullace. Some years ago, an old Botanist (W. Smith, Dewsbury), knew it in a hedgerow, where Oxford Road now is.

410. **Prunus Avium** L. Gean. Planted in a copse, at Mirfield.

411. **Prunus cerasus** L. Wild cherry. Coxley Valley; Howley.

414. **Spiræa Ulmaria** L. Meadow-sweet.

416. **Rubus Idæus** L. Raspberry. Woods.

The following sub-species and varieties of **Rubus fruticosus** L. (Blackberry, Bramble) occur in the district:

424. **Rubus Lindleianus** Lees. Horbury.

432. **Rubus rusticanus** Merc. C.C.B. Netherton.

433. **Rubus leucostachys** Sm. Howley.

439. **Rubus villicaulis** W. & N. ('A plant between this and *Rubus macrophyllus*,' F. Arnold Lees, 'Flora of West Yorkshire,' page 217). Heybeck.

441. **Rubus macrophyllus** W. & N. Coxley Valley.

443. **Rubus Sprengelii** Weihe. Coxley Valley.

455. **Rubus Radula** Weihe. Copse, Soothill.

456. **Rubus Koehleri** Weihe, with vars. **infestus** W. & N. and **pallidus** Bab. Coxley Valley.

457. **Rubus fusco-ater** Weihe. Coxley Valley.

459. **Rubus diversifolius** Lindl. Horbury.

466. **Rubus Bellardi** Weihe. Whitley, near Dewsbury (H. F. Parsons).

471. **Rubus corylifolius** Sm. Hazel-leaved Bramble. Coxley Valley.

478. **Geum urbanum** L. Common avens. Coxley Valley.

481. **Fragaria vesca** L. Wild strawberry. Hedgebanks. Common.

483. **Potentilla norvegica** L. A Norwegian cinquefoil. Canal wall near the water. Some of the plants, at least, seem to have perennial rootstocks like those from the Kolyma river in Siberia (vide 'Student's Flora,' third edition), as I have noticed for several years a fine sturdy specimen in the same chink of the wall.

485. **Potentilla Fragariastrum** Ehrh. Barren strawberry. Hedgebanks. Often mistaken for the wild strawberry.

488. **Potentilla Tormentilla** Scop. Tormentil. Dry banks.

490. **Potentilla reptans** L. Creeping cinquefoil.

491. **Potentilla anserina** L. Silver-weed. Way-sides.
497. **Alchemilla arvensis** Lamk. Parsley piert. Cornfields.
498. **Alchemilla vulgaris** L. Lady's mantle. Coxley Valley and Wood.
501. **Agrimonia Eupatoria** L. Agrimony. Coxley Valley.
505. **Poterium officinale** Hook. f. Great Burnet. Sewage works.
514E. **Rosa canina** L. Dog rose. Varieties,
Rosa dumalis Bechst.; and
514G. **Rosa urbica** Leman. Copse, Soothill.
516. **Rosa arvensis** Huds. Trailing rose. Coxley Valley.
525. **Pyrus aria** Sm. White beam. Planted or escaped (one bush, Stocksmoor). Shrubberies.
530. **Pyrus aucuparia** Gœrtn. Mountain Ash. Woods.
532A. **Pyrus malus** L. Crab-apple. Hedges.
534D. **Cratægus monogyna** Jacq. (sub-sp.). Hawthorn.
553. **Chrysosplenium oppositifolium** L. Common golden saxifrage. Streams. Coxley Valley; Hungerhills.
556. **Ribes grossularia** L. Gooseberry. Coxley Valley.
568. **Sedum acre** L. Stonecrop. Howley ruins.
573. **Sempervivum tectorum** L. House-leek. Old cottage roofs; possesses no claim to be indigenous.
581. **Callitriche verna** L. Water star-wort.
582. **Callitriche platycarpa** Kuetz. Pond, Netherton (and the terrestrial form, *C. stagnalis* Scop.). Ditch, Howley.
583. **Callitriche hamulata** Kuetz. (sub-sp.). Ditch, Howley.
590. **Epilobium angustifolium** L. French willow. Carlinghow; Coxley Valley.
592. **Epilobium hirsutum** L. Codlins-and-cream. Streams.
593. **Epilobium parviflorum** Schreb. Small-flowered willow-herb. Coxley Dam.
594. **Epilobium montanum** L. Broad-leaved willow-herb. Shady banks, very common.

598. **Epilobium obscurum** Schreb. (Sub-sp.). Square-stalked Willow-herb. Stream, North Wood, Netherton.

600. **Epilobium palustre** L. Marsh willow-herb. Boggy ground, near Bretton.

605. **Œnothera biennis** L. Evening primrose. Calder bank. No doubt a garden escape.

607. **Circæa lutetiana** L. Enchanter's night-shade. Streams and damp woods, not uncommon.

610. **Hydrocotyle vulgaris** L. Penny-wort. Abundant on Stocks Moor.

614. **Sanicula europæa** L. Wood sanicle. Coxley Wood.

617. **Conium maculatum** L. Hemlock. Calder banks (very large plants), and Spen Valley.

624. **Apium graveolens** L. Wild celery. Marshy place, Coxley Valley. Rare.

625. **Apium nodiflorum** Reichb. Marsh-wort. Canal side, between Thornhill and Horbury.

626. **Apium inundatum** Reichb. Least Marsh-wort. Canal, Savile Town.

637. **Ægopodium podagraria** L. Herb gerard. Coxley Valley.

638. **Pimpinella saxifraga** L. Burnet-saxifrage. Hilly pasture, Hungerhills.

640. **Conopodium denudatum** Koch. Earth-nut.

641. **Myrrhis odorata** Scop. Sweet cicely. Calder Valley, in several places.

642. **Chærophyllum temulum** L. Rough chervil. Hedge-banks, uncommon.

643. **Scandix pecten-veneris** L. Shepherd's needle. Corn-fields.

645. **Anthriscus sylvestris** Hoffm. Beaked parsley.

655. **Œnanthe crocata** L. Hemlock water drop-wort. Very poisonous, often mistaken for celery. Coxley Dam; ditch, Netherton.

658. **Æthusa Cynapium** L. Fool's parsley.

660. **Silaus pratensis** Besser. Pepper-saxifrage. Damp meadow, Hungerhills.
664. **Angelica sylvestris** L. Wild angelica. Woods.
670. **Heracleum Sphondylium** L. Cow parsnip.
672. **Daucus Carota** L. Carrot. Dry field, Netherton.
677. **Caucalis Anthriscus** Huds. Hedge parsley.
679. **Hedera Helix** L. Ivy.
682. **Adoxa Moschatellina** L. Moschatel. Coxley Wood.
683. **Sambucus nigra** L. Elder.
684. **Sambucus Ebulus** L. Dwarf elder. Railway embankment, Cleckheaton (Rev. W. Fowler, M.A.).
685. **Viburnum Opulus** L. Guelder-rose. Woods and hedges.
689. **Lonicera Periclymenum** L. Honeysuckle.
693. **Galium Cruciata** Scopoli. Crosswort.
694. **Galium verum** L. Lady's bedstraw. Sandy banks.
697. **Galium saxatile** L. Smooth heath bedstraw.
699. **Galium palustre** L. Water bedstraw. And variety,
699c. **Galium Witheringii** Sm. Coxley Valley.
703. **Galium Aparine** L. Cleavers.
705. **Asperula odorata** L. Wood-ruff. Woods and copses.
709. **Sherardia arvensis** L. Field madder. Waste and cultivated ground.
711. **Valeriana officinalis** L. Cat's valerian. Stream banks in woods.
715. **Valerianella olitoria** Mœnch. Lamb's lettuce. Cornfields.
722. **Scabiosa succisa** L. Devil's bit. Common. White flowers, Hartley Bank.
724. **Scabiosa arvensis** L. Field scabious. Coxley Valley.
727. **Solidago Virgaurea** L. Golden rod. River wall, Thornhill Lees; Coxley Wood.
728. **Bellis perennis** L. Daisy.
742. **Gnaphalium uliginosum** L. Marsh cud-weed. Bradford Road; Coxley Valley.

751. **Pulicaria dysenterica** Gœrtn. Flea-bane. Old Lane, Stocks Moor.

753. **Xanthium strumarium** L. Waste heap, railway side, Batley Station. A casual.

754. **Xanthium spinosum** L. Waste woollen heaps, Dewsbury and Batley. A casual.

756. **Bidens tripartita** L. Bur-marigold. Canal; Skating pond, Thornhill Lees.

758. **Achillea Millefolium** L. Yarrow.

759. **Achillea Ptarmica** L. Sneeze-wort. Boggy meadows.

763. **Anthemis arvensis** Corn chamomile. Waste ground, Horbury Bridge.

765. **Chrysanthemum segetum** L. Corn marigold. Cornfield, Batley.

766. **Chrysanthemum Leucanthemum** L. Ox-eye daisy. Pastures.

767. **Chrysanthemum Parthenium** Pess. Fever-few. Hedgebank, Spen Valley; Hartley Bank.

768. **Matricaria inodora** L. Scentless mayweed.

769. **Matricaria chamomilla** L. Wild chamomile. Waste corner of field, Batley; Horbury Bridge.

770. **Tanacetum vulgare** L. Tansy. Calder banks, very abundant.

772. **Artemisia vulgaris** L. Mugwort.

775. **Tussilago Farfara** L. Coltsfoot.

777. **Petasites vulgaris** Desf. Butter-bur. Banks of streams.

779. **Doronicum Pardalianches** L. Leopard's-bane. Copse, Batley; rare (I. Binns). A casual.

781. **Senecio vulgaris** L. Groundsel.

782. **Senecio sylvaticus** L. Mountain groundsel. Dry bank, copse, Batley; cultivated ground.

785. **Senecio erucifolius** L. Downy rag-wort. Plantation, Soothill; old lane, Stocks Moor.

786. **Senecio Jacobæa** L. Common ragwort.

787. **Senecio aquaticus** Huds. Marsh ragwort. Marshy part of Coxley Dam.

796. **Arctium Lappa** sub-sp. **A. minus** Schkuhr. Burdock. Waste places, woods, &c.

801. **Cnicus lanceolatus** Hoffm. Spear-thistle.

803. **Cnicus palustris** Hoffm. Marsh-thistle.

809. **Cnicus arvensis** Hoffm. Creeping-thistle.

816. **Centaurea nigra** L. Knapweed.

818. **Centaurea Cyanus** L. Bluebottle. Cornfield, Boothroyd.

823. **Cichorium Intybus** L. Chicory. Waste place, Batley. (I. Binns). The origin of the cultivated chicory.

823½. **Cichorium Endivia** An old pot-herb. Pasture, Dewsbury Moor.

825. **Lapsana communis** L. Nipplewort.

827. **Picris echioides** L. Ox tongue. Clover field, Heybeck, along with the Clover Dodder.

831. **Crepis virens** L. Smooth Hawk's-beard.

836. **Hieracium Pilosella** L. Mouse-ear hawkweed. Dry banks.

863D. **Hieracium sylvaticum** Sm. (*H. vulgatum* Fries). Disused lime burning pits, Horbury Bridge.

875. **Hieracium boreale** Fries. Very abundant on railway embankments.

877. **Hypochœris radicata** L. Cat's-ear.

880. **Leontodon hispidus** L. Hairy hawk-bit. Disused lime burning pits, Horbury Bridge.

881. **Leontodon autumnalis** L. Autumnal hawk-bit.

882A. **Taraxacum officinale** Web. Dandelion. (*T. Dens-leonis* Desf.).

886. **Lactuca muralis** Fresen. Wall lettuce. Wall, near Bretton.

889. **Sonchus oleraceus** L. Sow-thistle. Waste ground. The sub-sp.

890. **Sonchus asper** Hoffm. In a cornfield, Upper Batley.

891. **Sonchus arvensis** L. Corn sow-thistle. Cornfields.

893. **Tragopogon pratensis** L. Goat's beard. Meadows and waste places.

897. **Jasione montana** L. Sheep's-bit. Rare. Storr's Hill, Ossett.

903. **Campanula latifolia** L. Giant bell-flower. Copse, Hungerhills. Rare.

905. **Campanula rotundifolia** L. Hare-bell.

913. **Vaccinium Myrtillus** L. Bilberry. Coxley Wood.

918. **Calluna vulgaris** Salisb. Ling. Coxley Wood.

941. **Primula vulgaris** Huds. Primrose. Whitley.

942. **Primula veris** L. Cowslip. Hilly pasture, Netherton.

953. **Lysimachia nemorum** L. Yellow pimpernel. Moist places.

956. **Anagallis arvensis** L. Scarlet pimpernel. Cornfields.

961. **Fraxinus excelsior** L. Ash.

962. **Ligustrum vulgare** L. Privet. Planted in shrubberies.

966. **Chlora perfoliata** L. Yellow-wort. Disused lime burning pits, Horbury Bridge. Originally will have come with the limestone.

967. **Erythræa Centaurium** Pers. Centaury. Occurs sparingly in Coxley Valley.

994. **Myosotis cæspitosa** Schultz. Tufted water Forget-me-not. Moist place, Stocks Moor.

995. **Myosotis palustris** With. True Forget-me-not. Canal. The sub-sp.,

996. **Myosotis repens** D. Don. Creeping water Forget-me-not. Wet place, near Bretton.

999. **Myosotis arvensis** Hoffm. Field Forget-me-not.

1000. **Myosotis collina** Hoffm. Early field Forget-me-not. Coxley Valley.

1001. **Myosotis versicolor** Reichb. Yellow and blue For-me-not. Damp pasture, Coxley Valley.

1005. **Lithospermum arvense** L. Corn gromwell. Waste ground, Horbury Bridge.

1006. **Echium vulgare** L. Viper's bugloss. Overton; Thornhill Edge (W. Rushforth).

1008. **Convolvulus sepium** L. Great Bindweed. Hedges.

1010. **Convolvulus arvensis** L. Small Bindweed.

1014. **Cuscuta Epithymum** Murr. var. **Cuscuta Trifolii** Bab. Clover dodder. Clover field, Heybeck.

1015. **Solanum Dulcamara** L. Bitter-sweet.

1017. **Lycium barbarum** L. About old cottages. A casual.

1031. **Linaria minor** Desf. Lesser toad-flax. Cultivated field, Heybeck.

1035. **Linaria vulgaris** Mill. Toad-flax.

1039A. **Scrophularia aquatica** L. (**Scrophularia balbisii** Hornem.). Water fig-wort. By a stream, between Middlestown and Horbury Bridge. Rare.

1041. **Scrophularia nodosa** L. Knotted figwort.

1047. **Digitalis purpurea** L. Foxglove.

1048. **Veronica hederæfolia** L. Ivy-leaved speedwell. Cultivated ground.

1049. **Veronica agrestis** L. Field speedwell. The sub-sp.

1050. **Veronica polita** Fries. Dewsbury Moor.

1051. **Veronica Buxbaumii** Ten. Buxbaum's speedwell. Cornfield, Hartley Bank.

1054. **Veronica arvensis** L. Wall speedwell.

1056. **Veronica serpyllifolia** L. Thyme-leaved speedwell. Coxley Valley.

1062. **Veronica officinalis** L. Common speedwell. Howley Hill.

1063. **Veronica Chamædrys** L. Germander speedwell.

1064. **Veronica montana** L. Mountain speedwell. Coxley Valley; North Wood. Rare.

1065. **Veronica scutellata** L. Marsh speedwell. Wet places, Stocks Moor.

1067. **Veronica Beccabunga** L. Brooklime.

1068. **Euphrasia officinalis** L. Eye-bright. Coxley Valley; near Stocks Moor.

1069B. **Bartsia Odontites** Huds. var. **serotina** Reichb. Red Bartsia. Cornfields and waste places. Not abundant.

1073. **Pedicularis sylvatica** L. Field louse-wort. Wet meadows; not common.

1076. **Melampyrum pratense** L. Cow-wheat. Coxley Wood.

1078. **Rhinanthus Crista-galli** L. Yellow-rattle.

1091. **Lathræa squamaria** L. Toothwort. On roots of sycamore, Hopton (C. P. Hobkirk, F.L.S.).

1108. **Mentha aquatica** L. Water mint. Wet places.

1109. **Mentha sativa** L. Marsh whorled mint. Margin of Coxley Dam.

1114. **Mentha arvensis** L. Corn mint. The variety

1114C. **Mentha agrestis** Sole. Waste ground, Horbury Bridge.

1116. **Lycopus europæus** L. Gipsy-wort. Canal bank.

1120. **Calamintha Clinopodium** Benth. Wild basil. Coxley Valley. Rare.

1129. **Nepeta Glechoma** Benth. Ground ivy. Hedgebanks.

1130. **Scutellaria galericulata** L. Skull-cap. Abundant on the canal bank.

1132. **Brunella vulgaris** L. Self-heal.

1135. **Stachys Betonica** Benth. Wood betony. Meadows and woods.

1137. **Stachys palustris** L. Marsh wound-wort. Canal banks.

1139. **Stachys sylvatica** L. Hedge wound-wort.

1140. **Stachys arvensis** L. Corn wound-wort. Corn-fields.

1145. **Galeopsis Tetrahit** L. Hemp-nettle. The sub-sp.

1146. **Galeopsis speciosa** Miller (*G. versicolor* Curt.). Large flowered hemp-nettle. Waste ground, Dewsbury Moor.

1151. **Lamium purpureum** L. Red dead-nettle.

1153. **Lamium album** L. White dead-nettle. Thornhill Lees; Heybeck.

1154. **Lamium Galeobdolon** Crantz. Yellow archangel. Woods, fairly abundant.

1159. **Teucrium Scorodonia** L. Wood-sage.

1160. **Ajuga reptans** L. Bugle. Wet pastures.

1163. **Plantago major** L. Greater plantain.

1164. **Plantago media** L. Hoary plantain. Coxley Valley.

1166. **Plantago lanceolata** L. Ribwort.

1181. A.B.C. **Chenopodium album** L. White goose-foot. All the three varieties—*candicans* Lamk., *viride* L., and *paganum* Reichb.

1190. **Chenopodium Bonus-Henricus** L. Good King Henry. Pasture, Carlinghow.

1193B. **Atriplex patula** L. (*A. erecta* Huds.). Road-side, Netherton.

1205. **Polygonum Convolvulus** L. Black bindweed. Corn-fields.

1207. A.E. **Polygonum aviculare** L. Knotgrass. The varieties *agrestinum* Jord. and *rurivagum* Jord.

1210. **Polygonum Hydropiper** L. Water-pepper. Stream banks.

1213. **Polygonum Persicaria** L. Common persicaria.

1214. **Polygonum lapathifolium** L. Pale-flowered persicaria. Corn-fields and waste places.

1216. **Polygonum amphibium** L. Amphibious persicaria. Var. B. *terrestre* is by far the commonest form.

1217. **Polygonum Bistorta** L. Snake-weed. Meadows, Carlinghow; Netherton.

1219. **Polygonum Fagopyrum** L. Corn-field, Thornhill Lees.

1222B. **Rumex sanguineus** L. (*viridis* Sibth.). Green-veined dock. Old lane, Stocks Moor.

1226. **Rumex obtusifolius** L. Broad-leaved dock.

1229. **Rumex crispus** L. Curled dock.

1233. **Rumex Acetosa** L. Sorrel.

1235. **Rumex Acetosella** L. Sheep's sorrel.

1237. **Asarum europæum** L. Asarabacca. Kirklees Park, probably introduced (H. T. Soppitt).

1245. **Euphorbia Helioscopia** L. Sun spurge. Corn-fields.

1254. **Euphorbia Cyparissias** L. Cypress spurge. 'Dewsbury,' per 'Watson Botanical Exchange Club' (C. J. Wilson).

1257. **Euphorbia Peplus** L. Petty spurge. Cultivated ground.

1258. **Euphorbia exigua** L. Dwarf spurge. Corn-fields.

1261. **Mercurialis perennis** L. Dog's mercury.

1263. **Ulmus montana** Sm. Wych elm. Hedges.

1264A. **Ulmus campestris** Sm. var. **suberosa** Ehrh. Common elm.

1265. **Humulus Lupulus** L. Hop. Apparently indigenous in a hedge-row, Healey near Batley, and Thornhill.

1266. **Urtica dioica** L. Nettle.

1268. **Urtica urens** L. Small nettle. Waste ground, Dewsbury Moor.

1271. **Betula alba** L. Birch. Woods and copses.

1274. **Alnus glutinosa** Gœrtn. Alder. Stream-banks.

1276. **Corylus Avellana** L. Hazel.

1277. **Quercus Robur** L. Oak.

1278. **Castanea vulgaris** Lamk. Spanish chestnut. Parks, plantations, &c., introduced.

1279. **Fagus sylvatica** L. Beech. Shrubberies.

1281. **Salix fragilis** L. Crack willow. Withy. Banks of streams, &c.

1282. **Salix alba** L. White willow. Canal-bank between Thornhill Lees and Horbury.

1289. **Salix viminalis** L. Osier. Wet places and osier-beds.

1295. **Salix Caprea** L. Goat willow. Its sub-species,

1297. **Salix cinerea** L. Grey willow. Coxley Valley.

1311. **Populus alba** L. White poplar. Hedge-row, Netherton. Not indigenous.

1313. **Populus tremula** L. Aspen.

1314. **Populus nigra** L. Black poplar. Plantations, &c., not indigenous.

1316. **Ceratophyllum demersum** L. Hornwort. Disused lock, canal, Healey, near Horbury.

1321. **Pinus sylvestris** L. Scotch fir. A group of four fast-dying old trees, Coxley Valley. Indigenous?

1323. **Elodea canadensis** Michx. Water-thyme. Canal, ponds, &c.

1331. **Listera ovata** Br. Tway-blade. Rare. Coxley Valley (W. Rushforth).

1340. **Epipactis latifolia** Sw. Helleborine. Coxley Wood; abundant in a copse near Bretton.

1352. **Orchis mascula** L. Purple orchis. Coxley Valley.

1356. **Orchis maculata** L. Spotted orchis. Moist meadows, Soothill; Coxley Valley.

1366. **Habenaria viridis** Br. Frog orchis. Rare. Coxley Valley (W. Rushforth).

1388. **Tamus communis** L. Black bryony. Hedges, common.

1407. **Allium ursinum** L. Garlic. Ramsons.

1411. **Scilla nutans** Sm. Wild hyacinth.

1425. **Juncus bufonius** L. Toad rush. Marshy places.

1433. **Juncus glaucus** Ehrh. Hard rush. Margin of Coxley Dam, &c.

1435. **Juncus effusus** L. Soft rush. Moist places. The var.

1436. **Juncus conglomeratus** L. Undrained pastures.

1439. **Juncus supinus** Mœnch. Sharp-flowered jointed rush. Boggy ground, near Bretton. The erect variety

1439D. **Juncus uliginosus** Sibth. Pond, near Bretton. The sub-species,

1442. **Juncus lamprocarpus** Ehrh. Shining-fruited jointed rush. Coxley Dam. The tall form, with leaves very conspicuously jointed when dry,

1443. **Juncus articulatus** proper (*Juncus acutiflorus* Ehrh.). Stocks Moor.

1449. **Luzula vernalis** DC. (*Luzula pilosa* Willd.). Hairy wood-rush. Woods.

1450. **Luzula maxima** (*L. sylvatica* Gaud.). Great wood-rush. Coxley Wood.

1453. **Luzula campestris** Willd. Field wood-rush. Common on dry pastures.

1455. **Typha latifolia** L. Bullrush. Some years ago, the dark brown spikes were very prominent on the margin of 'Bullrush' mill dam, Batley. I am unable to say whether the plant still grows in the Dewsbury district.

1457. **Sparganium ramosum** Huds. Bur-reed. Skating pond, Thornhill Lees; Coxley Dam; ditch, Howley.

1459. **Sparganium simplex** Huds. Unbranched bur-reed. Coxley Dam.

1462. **Arum maculatum** L. Cuckoo-pint. Woods and hedge-banks, not uncommon.

1466. **Lemna minor** L. Lesser duck-weed. Ponds and ditches.

1470. **Alisma Plantago** L. Water plantain. Edges of streams.

1479. **Potamogeton natans** L. Broad-leaved pond-weed. Still water, in several places.

1480. **Potamogeton polygonifolius** Pourr. Canal.

1496. **Potamogeton crispus** L. Curled pond-weed. Skating pond, Thornhill Lees.

1502. **Potamogeton pusillus** L. Small pond-weed. Coxley Dam; pond, Soothill.

1505. **Potamogeton pectinatus** L. Fennel-leaved pond-weed. Canal.

1510. **Zannichellia palustris** L. Horned pond-weed. Pond, Batley; rare.

1522. **Heleocharis acicularis** Sm. Lesser spike-rush. Sandy edges of canal. Not common.

1523. **Heleocharis palustris** Br. Creeping spike-rush. Coxley Dam. Abundant.

1531. **Scirpus setaceus** L. Bristle-stalked mud-rush. Undrained meadow, Coxley Valley.

1539. **Scirpus sylvaticus** L. Wood club-rush. Marshy shaded part of Coxley Dam.

1565. **Carex vulpina** L. Great rough sedge. Margin of Coxley Dam.

1567. **Carex muricata** L. Greater prickly sedge. Roadside, Stocks Moor.

1570. **Carex remota** L. Distant-spiked sedge. Common on the banks of streams.

1577. **Carex leporina** L. Oval-spiked sedge. Wet meadow, Batley; Coxley Valley.

1587. **Carex Goodenovii** Gay. Tufted sedge. Coxley Valley.

1588. **Carex glauca** Murr. Glaucous heath sedge. Abundant in moist pastures.

1596. **Carex pilulifera** L. Round-headed sedge. Dry bank, Mirfield; rare.

1600. **Carex pallescens** L. Pale sedge. Marshy place, Hartley bank, Horbury.

1601. **Carex panicea** L. Pink-leaved sedge. Wet places, Coxley Valley; old lane, Stocks Moor.

1609. **Carex sylvatica** Huds. Wood sedge. Coxley Wood.

1610. **Carex lævigata** Sm. Smooth-beaked sedge. Wet copse, Mirfield; Coxley Wood, uncommon.

1616. **Carex flava** L. Yellow sedge. Common in marshy places, Coxley Valley. Var. B. *minor* Towns. Occurs in an old lane, near Stocks Moor.

1619. **Carex hirta** L. Hairy sedge. Stream fed by a spring, hill-side, off Warwick Road, Batley Carr.

1636. **Phalaris canariensis** L. Canary-grass. Waste places; an escape.

1638. **Phalaris arundinacea** L. Reed canary-grass. Canal bank, abundant.

1639. **Anthoxanthum odoratum** L. Sweet vernal grass.
1644. **Alopecurus geniculatus** L. Angular fox-tail grass. Ponds and wet places.
1646. **Alopecurus pratensis** L. Common fox-tail grass.
1648. **Milium effusum** L. Millet grass. Damp woods.
1650. **Phleum pratense** L. Timothy grass. Pastures.
1656. **Agrostis alba** L. Fiorin grass. Coxley Valley.
1657. **Agrostis vulgaris** With. Common bent-grass.
1671. **Aira præcox** L. Early hair-grass. Plentiful on dry banks, Coxley Valley.
1673. **Deschampsia cæspitosa** Beauv. Tufted hair-grass.
1676. **Deschampsia flexuosa** Trin. Wavy hair-grass. Dry banks.
1677. **Holcus mollis** L. Creeping soft-grass.
1678. **Holcus lanatus** L. Downy soft-grass.
1679. **Trisetum flavescens** Beauv. Yellow oat-grass.
1684. **Arrhenatherum avenaceum** Beauv. Common oat-grass.
1689. **Cynosurus cristatus** L. Dog's-tail-grass.
1695. **Melica uniflora** Retz. Common melic-grass. Woods and hedge-banks.
1696. **Dactylis glomerata** L. Cock's-foot-grass.
1698. **Briza media** L. Quaking-grass. Dry meadows.
1700. **Poa annua** L. Annual meadow-grass.
1710. **Poa pratensis** L. Smooth meadow-grass.
1711. **Poa trivialis** L. Rough meadow-grass.
1712. **Glyceria fluitans** Br. Floating sweet-grass. Ponds and ditches.
1714. **Glyceria aquatica** Sm. Water sweet-grass. Skating pond, Thornhill Lees.
1725. **Festuca ovina** L. Sheep's fescue-grass. Common. Var. c. **glauca** Lamk. Stocks Moor.
1725B. **Festuca duriuscula** L. (Sub-sp.). Hard fescue-grass. Meadow, Batley.
1730. **Festuca pratensis** Huds. Meadow fescue-grass. The variety

1730c. **Festuca loliacea** Curt. (not Huds.). Spiked-fescue-grass. Coxley Valley.

1732. **Festuca gigantea** Vill. Giant fescue-grass. Damp woods and hedge banks.

1732½. **Festuca triflora** Sm. The form, with few flowers, grows in Coxley Wood.

1733a. **Bromus asper** Murr. var. **serotinus** Benck. Hairy brome-grass. Common.

1738. **Bromus sterilis** L. Barren brome-grass.

1739. **Bromus secalinus** L. Rye brome-grass. In a corn-field, Thornhill Lees. A colonist.

1742. **Bromus mollis** L. Soft brome-grass.

1746. **Lolium perenne** L. Rye-grass. Var. e. *italicum* Braun. Margins of corn-fields, &c. An escape from cultivation.

1749. **Agropyrum caninum** Beauv. Bearded wheat-grass. Woods and hedge-banks.

1750. **Agropyrum repens** Beauv. Couch grass.

1750b. **Agropyrum repens** Beauv. var. **barbata** Duval-Jouve. Waste ground, Heybeck.

1755. **Nardus stricta** L. Mat-grass. Stocks Moor.

1765. **Pteris aquilina** L. Bracken.

1767. **Lomaria Spicant** Desv. Hard fern. Coxley Wood.

1775. **Asplenium Ruta-muraria** L. Wall-rue spleen-wort. Wall, Kirklees Park.

1778. **Asplenium Filix-fœmina** Bernh. Lady fern. The variety

1778½. **Asplenium incisum** Hoffm. Coxley Wood.

1793. **Nephrodium Filix-mas** Rich. Male fern.

1798. **Nephrodium spinulosum** Desv. Prickly-toothed buckler-fern. Marshy shaded place, Coxley Wood. Rare. The sub-sp.

1799. **Nephrodium dilatatum** Desv. Common buckler-fern. Abundant in woods.

1806. **Osmunda regalis** L. Fern-royal. Horbury. Apparently wild in this station (W. Rushforth).

1807. **Ophioglossum vulgatum** L. Adder's-tongue fern. Hilly pastures, not uncommon.

1809. **Botrychium Lunaria** Sw. Moonwort. Coxley Valley, rare (W. Rushforth).

1812. **Equisetum arvense** L. Corn horse-tail. Waste ground, common.

1814. **Equisetum sylvaticum** L. Wood horse-tail. Copses and hedge-banks.

1815. **Equisetum palustre** L. Marsh horse-tail. Coxley Dam ; marshy place, Heybeck.

1817. **Equisetum limosum** L. Smooth water horse-tail. Coxley Dam, in great abundance.

1833. **Chara fragilis** Desv. Coxley Dam.

1843. **Chara vulgaris** L. With var. B. *longibracteata* Kütz. Coxley Dam.

1857. **Nitella opaca** Agardh. Slow running stream, Coxley Dam.

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METEOROLOGY OF BRADFORD FOR 1886.

Computed from daily observations made at the Exchange, Bradford, by John McLandsborough, F.R.A.S., F.R.Met.Soc., F.G.S., and Alfred Eley Preston, Assoc. M. Inst. C.E., F.R.Met.Soc., F.G.S.

Latitude, 53deg. 47min. 38sec. N.; longitude, 1deg. 45min. 4sec. W. Height above mean sea level, 366ft.

Pressure of Atmosphere in Month

Months.	Highest Reading of Barometer	Date.	Mean of Highest of 18 Years.	Lowest Reading of Barometer.	Date	Mean of Lowest of 18 Years.	Range.	Corrected for Capillarity and Temperature: Mean	Mean of 18 Years
	Ins	On	Ins	Ins	On	In	Ins	Ins	Ins
January	29 713	7th	30 168	28 597	18th	28 601	1 146	29 198	29·504
February	30 218	9th	30 060	28 730	1st	28 740	1 518	29 091	29 479
March	[illegible]	11th	30 171	28 801	2nd	28 868	1 334	29 497	29 506
April	29 873	1[illegible]th	30 073	28 663	8th	28 810	1 417	29 465	29 474
May	[illegible]	5th	30 056	28 967	13th	29 015	1 117	29 473	29 550
June	[illegible]	[illegible]th	[illegible]	29 3[illegible]6	23rd	29 153	0 674	29 571	29 51[illegible]
July	30 009	3rd	29 974	28 965	14th	29 159	1 014	29 1[illegible]1	29 518
August	[illegible]	20th	29 981	29 119	1[illegible]th	29 072	0 826	29 548	29 5[illegible]8
September	[illegible]	16th	[illegible]	29 3[illegible]0	1[illegible]th	29 082	0 9[illegible]2	29 5[illegible]6	29 498
October	[illegible]	24th	30 119	28 360	15th	28·722	1 70[illegible]	29 [illegible]71	29 442
November	[illegible]	21st	30 050	28 524	8th	28 686	1·831	29 418	29 443
December	[illegible]	31st	30 106	27 652	8th	28 616	2 543	29 195	29 461
Means, or totals	30 0[illegible]		30 065	28 750		28 875	1 330	29 461	29 494

Temperature of Air in Shade during Month

Months.	Highest	Date.	Mean of Highest daily of 18 Years.	Lowest	Date	Mean of Lowest daily of 18 Years.	Range	Mean in Each Month: Of all Highest	Mean of 18 Years	Of all Lowest	Mean of 18 Years.	Daily Range: Mean	Mean of 18 Years	Of Dry Bulb: Mean.	Mean of 18 Years	Adopted Mean Temperature Of Air: Mean.	Mean of 18 Years	Of Evaporation: Mean.	Mean of 18 Years.	Dew Point: Mean.	Mean of 18 Years.
	Deg	On	Deg	Deg	On	Deg.	Deg	Deg	Deg.	Deg	Deg	Deg	Deg	Deg	Deg.	Deg	Deg	Deg.	Deg.	Deg	Deg.
January	51 7	4th	52 8	21 5	20th	23 8	30 2	39 5	42 9	31 2	34 3	8 3	8 6	35 4	39 2	35 4	38 7	34 2	37 0	32 3	34 8
February	46 2	11th	53 5	25·4	27th	26 6	20 8	38 0	44 5	31 5	35 6	7 4	8 9	35 2	40 0	35 0	[illegible]9 8	33 8	38·1	3[illegible] 9	35 9
March	50 6	25th	57 0	17·4	7th	26 1	42 2	42 5	46 8	33 4	35 5	9 1	11 3	39 2	40 7	37 6	40 3	36 0	38 0	33 8	35 1
April	67 0	28th	65 0	30 2	30th	31 3	36 8	5[illegible] 8	51 1	38 4	39 7	12 4	13 4	43 1	45 1	43·1	45 1	40 [illegible]	41 7	36 5	37 8
May	70 0	8th	69 7	34 6	2nd	34 6	35 4	55 4	58 3	43 6	43 6	11 8	14 7	48 8	49 4	48 3	49 3	44 5	45 0	40 4	40 8
June	71 8	2[illegible]th	77 1	40 4	4th	41 7	31 2	61 9	65 0	48 5	49 9	13 4	15 1	54 3	55 7	5[illegible] 9	55 6	49 6	51 1	44 8	46 7
July	79 5	3rd	80 5	4[illegible] 7	10th	46 9	32 8	67 1	68 7	53 [illegible]	54 0	13 3	14 7	59 4	60 3	59 0	60 1	54 0	54 5	49 5	50 4
August	78 0	31st	78 6	44 6	3rd	45 8	34 0	67·1	67 6	54 0	53 3	13 1	14 3	59 5	59 1	59 1	58 9	5[illegible] 6	54 2	50 6	50 5
September	76 4	1st	71 0	40 2	23rd	40 2	36 2	62 9	62 [illegible]	50 [illegible]	[illegible]9 5	12·1	12	56 0	54 6	55 7	54 8	51 7	61 4	47 9	48 1
October	65 [illegible]	1st	63 8	34 0	27th	32 8	31 2	5[illegible] 1	54 1	47 0	43 5	9·1	10 6	51 1	48 4	50 8	48 1	40 5	45 8	43 1	43 1
November	58 2	1st	56 5	33 1	22nd	28 4	24 8	48 7	47 3	40 8	38 2	7 9	9 1	44 5	42 7	44 4	42 3	41 0	40 1	38 9	37 3
December	51 2	6th	52 9	2[illegible] 6	18th	23 1	29 6	40 4	42 6	32 0	34 2	8 4	8 4	36 2	39 0	36 2	38 7	34 5	36 7	32 0	34 2
Means, or totals	64 8		64 9	[illegible]2 5		33 4	32 1	52 6	51 4	42 1	42 0	10 5	11 8	46 8	47 9	46 5	47 6	43 7	41 5	40 6	41 2

Vapour

Months.	Elastic Force: Mean	Mean of 18 Years	In a Cubic Foot of Air: Mean.	Mean of 18 Years	Short of Saturation	Mean of 18 Years.	Mean Weight of a Cubic Foot of Air.	Mean of 18 Years	Degree of Humidity (Complete Saturation = 100): Highest	Date	Mean of Highest of 18 Years	Lowest	Date	Mean of Lowest of 18 Years	Mean.	Mean of 18 Years
	Ins	Ins	Grs	Grs	Grs	Grs.	Grs	Grs	0—100	On	0—100	0—100	On	0—100	0—100	0—100
January	184	201	2 1	2 4	0 3	0 4	517	549	99	12th	97	70	5th	68	89	88
February	1[illegible]0	212	2 [illegible]	2 5	0 3	0 4	556	547	97	24th	97	67	16th	69	88	86
March	194	206	2 2	2 4	0·4	0 6	550	547	98	22nd	96	63	25th	57	86	83
April	216	230	2 5	2 7	0 7	0 8	514	541	97	7th	[illegible]4	39	30th	53	78	78
May	251	2[illegible]7	[illegible]	2 [illegible]	1 0	1·1	537	537	98	9th	9[illegible]	32	4th	45	74	73
June	296	319	3 1	3 0	1 4	1 4	533	531	[illegible]4	1st	93	46	24th	49	73	72
July	351	367	1 0	4 [illegible]	1 6	1 7	624	526	97	26th	91	45	2nd	[illegible]0	71	70
August	[illegible]	368	4 2	4 1	1 5	1·5	527	5[illegible]6	93	23rd	92	48	9th	52	73	71
September	336	[illegible]38	[illegible]8	3 8	1 2	1 0	53[illegible]	531	96	10th	9[illegible]	49	7th	5[illegible]	76	78
October	3[illegible]3	279	[illegible]8	3 2	0 4	0 6	532	5[illegible]7	99	5th	[illegible]	65	25th	62	91	83
November	238	223	2 7	2 [illegible]	0 6	0 5	641	544	97	5th	98	63	18th	63	81	83
December	1[illegible]2	190	2 1	[illegible]	0 4	0 4	546	548	97	22nd	93	68	9th	68	85	85
Means, or totals	261	267	3 0	[illegible]0	[illegible]	0 9	549	5[illegible]	97		[illegible]	55		58	80	79

Bright Sunshine; Temperature of Air in Sun's Rays; Wind Direction

Months	Bright Sunshine: Greatest Daily Duration	Date	Total of Month	Per cent of Possible Duration	Temperature of Air in Sun's Rays: Highest	Date.	Mean of Highest of 18 Years	Mean	Mean of 18 Years	Wind Direction, Relative Proportion of at 9 a.m.: N	NE	E	SE	S	SW	W	NW
	h min	On	h min		Deg	On	Deg	Deg.	Deg.	No	No	No	No	No	No	No	No
January	4 30	9th	24 1	10	60 0	16th	60 2	46 7	47 8	6	6	3	2	0	4	4	8
February	6 15	3rd	35 45	13	65 6	15th	71 7	53 5	62 8	5	7	2	5	1	2	1	5
March	7 5	7th	38 25	11	80 0	26th	83·9	59 3	61 9	5	9	0	4	3	6	2	2
April	8 30	28th	95 28	23	85·8	25th	97 5	69 8	73 2	8	3	1	4	2	5	5	2
May	10 10	7th	[illegible]2 19	17	93 2	7th	105 0	78 8	81 3	4	5	3	2	5	7	2	3
June	10 30	10th	103 40	21	101 0	29th	111 3	83 4	87 5	6	3	0	4	2	3	9	3
July	11 5	8th	12[illegible]	28	1[illegible] 8	6th	114 0	89 7	91 9	1	2	0	1	3	8	7	6
August	9 2[illegible]	1st	[illegible]0 20	[illegible]9	1[illegible]2 [illegible]	18th	110 9	88 8	89 5	3	2	2	0	3	7	8	6
September	7 50	8th	92 8	25	98 [illegible]	1st	99 9	83 0	80 7	2	2	6	1	2	9	2	8
October	6 0	2nd	[illegible]6 35	11	87 0	4th	86 5	70·7	66 9	5	[illegible]	5	6	5	1	5	1
November	4 50	19th	35 10	1[illegible]	72 5	16th	71 6	61 5	55 4	5	1	1	1	3	10	5	4
December	4 15	28th	44 40	15	67 2	11th	57 3	49 9	46 8	7	3	1	1	1	2	6	10
Means, or totals	7 35		851 48	19	84·4		89 1	69 8	60 7	69	45	24	31	30	64	66	66

Wind Pressure; Cloud; Rain

Months	Wind Pressure: Mean at 9 0 a.m.	Mean of 3 Years	Mean of all Daily Highest	Mean of all Daily Highest of 3 Years	Highest	Direction	Date	Mean of Highest of Month of 3 Years	Mean Amount of Cloud.	Number of Days it fell	Rain: Amount Collected.	Greatest Daily Fall	Date	Mean of 17 Years	Mean of seven Years ending with 1882, 65½ft above surface of ground	Mean of 7 Yrs ending with 1882 at T'n Hall and Mid Ry Station on surface of ground	Greater fall on surface at Town Hall & Mid Stn than at 65½ft above surface at Exch: Depth in Inches	Percentage of fall at Exch'ge
	lb per sq ft	lb per sq ft	lb per sq ft	lb per sq ft	lb per sq ft		On	lb per sq ft	0—10	No	Ins	Ins	On	Ins	Ins	Ins	Ins	Per cent
January	1 1	1 0	4 12	4 21	12 75	W	4th	15 25	8 [illegible]	23	5 22	0 98	26th	2 85	2 209	2 474	0 265	11 2
February	0 4	0 8	1 30	3 10	9 00	W	2nd	10 33	8 4	8	0 69	0 29	2nd	2 02	2 609	2 972	0 363	11 4
March	1 1	0 8	2 15	2 46	11 00	S S W	27th	12 17	7 6	19	3 25	0 [illegible]7	2nd	2 20	2 776	3 280	0 484	11 7
April	1·0	0 8	3 97	2 69	17 00	S S W	1st	10 [illegible]5	6 7	23	2 15	0 47	9th	2 16	2 518	2 535	0 319	11 2
May	0 8	1 0	2 24	2 87	[illegible]00	W	16th	[illegible] 33	7 8	1[illegible]	4 64	1 28	13th	1 81	2·103	2 277	0 174	10 8
June	1 0	0 6	2·50	1 97	12 00	W	16th	7 67	7 9	6	[illegible]07	0 53	2nd	2 52	2 [illegible]7	3 011	0 174	10 6
July	1 0	0 7	2 89	1 95	10 00	W	15th	5 92	6 8	10	4 85	2 13	26th	3 06	3 401	3 041	0 240	10 7
August	0 6	0 6	1 71	1 91	6 50	S W	27th	7 00	6 6	17	1 [illegible]	0 27	10th	2 61	3 654	3 892	0 238	10 7
September	0 9	1 0	2 42	2 74	[illegible] 00	S W	9th	8 50	7 0	13	1 63	0 12	10th	2 90	2 894	3 229	0 335	11 2
October	0 6	0 8	1 83	3 26	11 00	S S E	15th	12 58	8 4	24	4 92	0 65	2nd	3 77	3 640	4 012	0 372	11 0
November	0 5	0 7	2 25	2 44	10 00	S W	4th	11 33	7 4	11	1 79	0 74	6th	2 86	3 421	3 828	0 407	11 2
December	0 5	0 8	3 50	3 99	18 00	W S W	9th	15 08	7 7	26	4 36	0 62	12th	2 83	3 681	4 170	0 489	11 3
Means, or totals	0 8	0 8	2 58	2 80	11 10			10 45	7 5	205	35 [illegible]	1 7[illegible]		31 59	35 741	39 601	[illegible]	11 08

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METEOROLOGY OF BRADFORD FOR 1886.

YEARLY MAXIMUM AND MINIMUM ATMOSPHERIC PRESSURE, TEMPERATURE, HUMIDITY BRIGHT SUNSHINE, WIND PRESSURE, AND RAINFALL.

Year	Pressure: Highest: Reading of Barom during Year	Pressure: Highest: Date	Pressure: Lowest: Reading of Barom during Year	Pressure: Lowest: Date	Temperature: In Shade: Highest: R'ding of Maximum Thermom during Yr	Temperature: In Shade: Highest: Date	Temperature: In Shade: Lowest: R'ding of Minimum Thermom during Yr	Temperature: In Shade: Lowest: Date
	Ins		Ins		Deg		Deg	
1869	30 290	Dec 6	28 600	Feb 1	85 2	Aug 30	19 8	Dec 28
1870	30 284	Jan 19	28 308	Jan 8	85 0	July 25	16 6	Dec 23
1871	30 162	Mar 28	28 308	Jan 16	84 0	Aug 12	6 7	Jan 1
1872	30 156	April 6	28 070	Jan 24	86 4	July 23	24 8	Mar 27
1873	30 338	Feb 18	28 022	Jan 20	88 8	July 23	19 2	Feb 24
1874	30 476	Mar 6	28 276	Dec. 11	80 9	July 20	15·0	Dec 31
1875	30 305	July 7	28 484	Nov. 10	80 0	Aug 17	13 0	Jan. 1
1876	30 300	Jan 15	28 070	Dec 4	87 6	July 17	23 0	Jan 9
1877	30 358	Oct 6	28 300	Nov. 29	80 0	June 19	20 0	Mar 1
1878	30 320	Mar 16	28 630	April 1	89·6	July 19	13 9	Dec 26
1879	30 352	Dec 13	28 500	Feb 10	74·4	July 30	13 2	Dec 7
1880	30 332	Jan 7	28 154	Nov 16	81 3	Sep 5	20 8	Jan 20
1881	30 3 2	Mar 10	28 260	Oct 14	83 3	July 6	12 0	Jan 26
1882	30 641	Jan 18	28 452	Mar 1	77 4	Aug 12	18 6	Dec 11
1883	30 600	April 9	28 452	Sep 2	76 2	July 3	19 8	Mar 10
1884	30 64	Oct 5	28 376	Jan 27	84 4	Aug 12	26 5	Nov 30
1885	30 273	Mar 14	28 400	Jan 11	82 2	July 27	22 1	Dec 11
1886	30 355	Nov 24	27 652	Dec 8	79 5	July 3	17 4	Mar 7
Means	30 337		28 289		82 6		17 9	

Year	Temperature: Last and First Frost of Seasons: Date of Last Frost	Date of First Frost	Temperature: In Sun's Rays: Highest: Reading of Solar Thermom during Yr	Date	Humidity (Complete Saturation = 100): Highest: Degree of Humidity during Yr	Date	Humidity: Lowest: Degree of Humidity during Yr	Date
			Deg		0—100		0—100	
1869	Mar 27	Oct. 20	127 7	Aug. 30	99	Feb 8	42	Sep 24
1870	Mar 30	Nov 9	127 5	July 25	98	Jan 29	40	July 14
1871	April 11	Nov 13	128 7	July 17	98	July 7	43	Nov 2
1872	Mar 27	Nov 19	124 8	Aug 19	100	Mar 22	45	Sep 23
1873	Mar 14	Nov 5	124 5	July 23	100	Dec 11	41	Mar 26
1874	Mar 12	Nov 11	125 8	July 20	100	Feb 6	42	May 18
1875	Mar 22	Nov 26	122 0	July 5	100	Jan 23	43	July 6
1876	April 15	Nov 9	125 6	July 16	99	Oct 4	46	May 5
1877	May 4	Oct 18	116 4	June 19	100	Oct 29	35	May 23
1878	April 6	Nov 9	118 2	July 22	99	Jan 13	53	Aug 9
1879	May 10	Nov 14	101 2	Aug 13	100	Oct 7	51	Dec 12
1880	Feb 23	Oct 20	112 0	Aug. 13	99	Dec 15	50	May 30
1881	April 21	Oct 17	116 5	June 1	98	Oct 14	38	May 31
1882	April 16	Nov 12	108 0	Aug 9	99	Nov 5	38	May 18
1883	Mar 29	Nov 12	107 6	May 17	99	Dec 26	30	April 9
1884	April 24	Nov 24	107 8	Aug 9	98	Jan. 23	30	May 22
1885	April 5	Nov 16	113 6	July 27	100	Jan 23	32	June 4
1886	April 30	Dec 2	108 8	July 5	99	Jan 12	32	May 4
Means			117 6		99		40	

Year	Bright Sunshine: Greatest Daily Duration	Date	Total of Year	Per cent of Possible Duration	Wind Pressure: Highest	Date	Rain: Total for Year	Mean Y'rly Rainfall at Town Hall and Mid Rly Stn on surface of g'nd	Gr'tr fall on srfce at Tn H'll & Mid Stn than at 65½ ft. ab've surf at Exe: Depth in Inches	Percentage of fall at Exch'ge	Greatest Daily Fall during Yr.	Date	Snow: Last and First Snow of Seasons: Date of Last Snow	Date of First Snow
	hr min		hr min		lb per sq. ft		Ins	Ins	Ins	Per cent	Ins			
1869													April 3	Oct. 19
1870							24 120				0 820	June 18	Mar 24	Nov 15
1871							21 640				0 985	June 16	Mar. 16	Nov 16
1872							42 060				2 490	June 19	May 11	Nov 13
1873							21 440				1 200	Aug 4	April 25	Jan 3, '74
1874							23 560				0 740	Dec 7	May 9	Nov 28
1875							30 280				1 700	Nov 15	Mar 12	Nov 9
1876							35 270	39 788	4 518	11 28	1 810	Oct 9	April 12	Nov 8
1877							40 050	45 499	4 549	11 19	1·420	July 16	May 19	Oct 16
1878							35 434	39 010	3 576	11 01	1 220	Aug 14	April 1	Nov 8
1879							28 017	30 298	2 281	10 82	1 020	June 8	May 7	Nov 20
1880							35 690	39 616	3 926	11 10	1 710	Oct 27	Mar 2	Oct 27
1881							35 434	39 892	4 458	11 26	1 435	Oct 13	April 20	Oct. 29
1882							39 683	43 103	3 420	10 86	1 608	Dec 6	Mar 21	Nov 19
1883							34 396				1 338	Sep 26	Mar 24	Nov 10
1884					21 00	Jan 24	27 657				1 170	Jan 23	Feb 28	Nov 23
1885					15 25	Dec 4	25 699				1 20	Sep 3	May 7	Dec 9
1886	11 45	July 6	851 48	19	18 00	Dec 9	35 993				2 1 0	July 26	May 12	Nov 6
Means					19 08		31 590	39 601	3 860	11 08	1 412			

EXPLANATION

The observations are made at nine a m , and, with the exception of maximum and minimum thermometer readings, again at three p m

The highest and lowest barometric readings for each month, also the monthly range, are given as recorded , while the mean pressure is deduced from bi-daily observations corrected for index error, capillarity, temperature, and diurnal range To correct for altitude or reduce to sea level (the air temperature being 48 degrees and barometer reading 30 inches at sea level), add 401 inch to the heights given.

A remarkable instance of barometric depression occurred on the 8th December 1886, when at 0 40 p m. the mercury of the Exchange barometer had fallen to 27 456 inches only the lowest reading on record here The cyclone indicated by this depression was the cause of great loss of life and property, extending over an unusually large district

All thermometric observations and deductions are given in degrees Fahrenheit

The adopted mean temperature of air is deduced from the dry bulb and the maximum and minimum readings; the temperature of evaporation from the dry and wet bulb and the maximum and minimum readings The dew point, elastic force of vapour, humidity, &c , are deduced from bi-daily readings of the dry and wet bulb hygrometer, by Glaisher's Hygrometrical Tables, sixth edition.

The sunshine is recorded in hours and minutes by glass sphere on cards fixed on Professor Stokes' zodiacal frame

The solar thermometer has a black bulb enclosed in a vacuum

The direction and pressure of wind are recorded as indicated by an anemometer fixed 10½ feet above the ridge of roof of Exchange The pressure is given in pounds avoirdupois per square foot

The amount of cloud is estimated by a scale ranging from 0 to 10

The rain gauge is fixed upon the top of central roof of the Exchange, at an elevation of 65½ feet above the surface of the ground and 395 feet above mean sea level. As rain gauges on the summit of buildings are generally found to collect less rain than when placed upon the surface of open ground adjacent thereto, steps were taken in 1876 to determine to what extent this was the case with the Exchange rain gauge, when two additional gauges were provided and fixed upon the surface of adjacent open spaces, one near to the Town Hall, the other near to the Midland Railway Station, between which the Exchange gauge is situate about midway, and the surface of ground about the same height At both of these gauges, as well as at the Exchange gauge, daily observations were made from the commencement of 1876 to the end of 1882, a period of seven years, when the surface gauges were removed in consequence of the ground they occupied being no longer available for the purpose The particulars of these gaugings are set forth in tables The results show that the mean yearly rainfall on the surface of ground for the seven years ending with 1882 is 3 86 inches, or 11·08 per cent , greater than at the summit of the Exchange The mean yearly rainfall recorded at the Exchange for the seventeen years ending with 1886 is 31·590 inches By adding 11 08 per cent thereto the mean normal rainfall of central Bradford for such period is found to be 35 090 inches per annum There are good grounds for concluding that the smaller amount of rainfall collected on the Exchange—and on buildings generally—than on the surface of ground is due to the varying direction and force of wind there producing different currents and eddies, which prevent due precipitation on the top or ridge of roof where the gauge is fixed The rainfall of 1869 was collected by a gauge placed on the ridge of outer roof of Exchange, near to the north-west corner thereof This position not being deemed quite satisfactory, the gauge was removed at the end of that year to the ridge of central roof—the place it has since occupied To avoid risk of inaccurate results the rainfall of 1869 is omitted from these returns

The instruments with which the observations are made have been verified by comparison with the standards at Kew Observatory

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METEOROLOGY OF BRADFORD FOR 1887.

Computed from daily observations made at the Exchange, Bradford, by John McLandsborough, F.R.A.S., F.R.Met.Soc., F.G.S., and Alfred Eley Preston, Assoc. M. Inst. C.E., F.R.Met.Soc., F.G.S.
Latitude, 53deg. 47min. 38sec. N.; longitude, 1deg. 45min. 4sec. W. Height above mean sea level, 366ft.

Pressure of Atmosphere in Month.

Months	Highest Reading of Barometer	Date	Mean of Highest of 19 Years	Lowest Reading of Barometer	Date	Mean of Lowest of 19 Years	Range	Corrected for Capillarity and Temperature: Mean	Corrected: Mean of 19 Years
	Ins	On	Ins	Ins.	On	Ins	Ins	Ins	Ins.
January	30·209	20th	30·165	28·462	5th	28·679	1·747	29·467	29·503
February	30·412	6th	30·076	29·226	2nd	28·765	1·186	29·827	29·497
March	30·232	2nd	30·137	28·601	23rd	28·607	1·631	29·620	29·612
April	30·280	17th	30·084	28·860	23rd	28·813	1·420	29·667	29·479
May	30·114	14th	30·059	28·769	20th	29·030	1·345	29·606	29·653
June	30·136	30th	30·008	29·380	3rd	29·165	0·758	29·743	29·656
July	30·006	1st	29·976	29·160	27th	29·159	0·846	29·573	29·521
August	30·055	3rd	29·966	28·993	31st	29·068	1·062	29·641	29·510
September	30·201	24th	30·077	28·583	2nd	28·942	1·618	29·459	29·494
October	30·221	17th	30·124	28·920	30th	28·733	1·301	29·672	29·454
November	29·947	16th	30·045	28·328	3rd	28·668	1·619	29·290	29·435
December	30·018	2nd	30·101	28·819	6th	28·656	1·199	29·347	29·455
Means, or totals	30·153		30·070	28·842		28·874	1·311	29·561	29·497

Temperature of Air in Shade during Month.

Months	Highest	Date	Mean of Highest daily of 19 Years	Lowest	Date	Mean of Lowest daily of 19 Years	Range	Mean, In Each Month: Of all Highest	Mean of 19 Years	Of all Lowest	Mean of 19 Years	Daily Range: Mean	Mean of 19 Years	Of Dry Bulb: Mean	Mean of 19 Years	Adopted Mean Temperature, Of Air: Mean	Mean of 19 Years	Of Evaporation: Mean	Mean of 19 Years	Dew Point: Mean	Mean of 19 Years
	Deg	On	Deg	Deg.	On	Deg.	Deg	Deg	Deg.	Deg.	Deg	Deg.	Deg	Deg	Deg	Deg.	Deg	Deg	Deg	Deg	Deg.
January	53·3	31st	52·8	21·1	17th	23·5	32·2	41·7	42·9	32·6	34·2	9·1	8·7	36·0	39·1	37·5	38·7	35·7	37·0	33·2	34·7
February	56·6	28th	53·7	24·6	10th	26·7	32·0	44·8	44·6	34·7	35·5	10·1	9·0	39·3	40·0	38·3	39·8	37·0	38·1	34·0	36·8
March	56·8	1st	57·0	22·7	17th	25·9	33·9	44·4	46·7	33·7	36·4	10·7	11·3	38·8	40·8	36·4	40·2	36·8	37·9	32·6	34·9
April	58·0	13th	64·6	29·8	16th	31·3	28·4	50·9	53·0	37·1	39·6	13·8	13·4	42·6	44·9	42·5	44·9	38·9	41·6	34·6	37·7
May	67·0	9th	69·8	33·9	2nd	34·6	33·1	54·2	58·1	42·9	43·6	11·3	14·6	47·8	49·3	47·3	49·2	43·9	44·9	40·1	40·8
June	78·6	15th	77·3	42·2	1st	41·7	37·4	68·5	65·2	52·0	50·0	16·5	16·2	56·6	55·8	58·5	55·7	52·7	51·2	47·5	46·7
July	82·8	9th	80·8	42·8	6th	46·6	40·0	72·2	68·8	55·8	54·1	16·4	14·8	63·3	60·5	62·7	60·3	55·5	54·6	49·3	50·3
August	81·2	7th	78·7	38·6	14th	46·4	42·6	67·6	67·6	51·7	53·2	15·8	14·4	58·2	59·1	58·0	58·9	52·1	54·1	46·8	50·3
September	63·4	1st	70·6	33·6	28th	39·9	29·6	58·2	62·0	47·9	49·5	10·3	12·5	52·3	54·5	52·0	54·6	48·7	51·3	46·3	48·0
October	57·3	3rd	63·4	30·8	12th	32·7	26·6	50·4	53·9	40·1	43·3	10·3	10·6	45·1	48·2	44·6	47·9	41·2	45·6	36·8	42·7
November	52·0	27th	56·3	27·6	16th	28·4	24·4	44·5	47·1	37·6	38·1	6·9	9·0	40·6	42·6	40·6	42·3	38·5	40·0	35·8	37·2
December	50·9	14th	52·8	24·8	29th	23·2	26·1	42·7	42·6	34·1	34·2	8·6	8·4	38·6	39·0	38·4	38·8	36·1	36·6	33·0	34·2
Means, or totals	65·2		64·8	31·0		33·3	32·2	53·3	54·4	41·7	42·6	11·6	11·8	46·9	47·8	46·6	47·6	43·0	44·4	39·1	41·1

Vapour.

Months	Elastic Force: Mean	Mean of 19 Years	In a Cubic Foot of Air: Mean	Mean of 19 Years	Short of Saturation	Mean of 19 Years	Mean Weight of a Cubic Foot of Air	Mean of 19 Years	Degree of Humidity (Complete Saturation = 100): Highest	Date	Mean of Highest of 19 Years	Lowest	Date	Mean of Lowest of 18 Years	Mean	Mean of 19 Years
	Ins.	Ins	Grs	Grs.	Grs	Grs	Grs	Grs	0—100	On	0—100	0—100	On	0—100	0—100	0—100
January	·190	·203	2·2	2·4	0·5	0·4	551	549	89	14th	97	63	25th	67	85	86
February	·196	·211	2·3	2·6	0·6	0·4	554	547	83	17th	97	42	28th	67	82	86
March	·184	·204	2·2	2·4	0·6	0·5	551	547	88	5th	96	65	24th	67	80	83
April	·207	·229	2·3	2·7	0·6	0·8	546	541	100	21st	94	49	26th	53	74	77
May	·256	·257	2·8	2·9	0·9	1·1	541	537	84	25th	91	44	31st	46	77	74
June	·330	·320	3·7	3·6	1·8	1·4	531	531	91	26th	93	43	27th	49	68	72
July	·353	·366	3·9	4·1	2·4	1·7	524	526	84	13th	91	35	9th	49	62	70
August	·320	·365	3·6	4·1	1·8	1·5	528	526	90	13th	92	41	24th	51	66	74
September	·303	·336	3·4	3·8	1·0	1·0	533	531	99	2nd	98	52	8th	66	78	78
October	·218	·276	2·6	3·2	0·8	0·6	545	537	90	9th	96	51	11th	62	73	83
November	·210	·223	2·4	2·6	0·5	0·5	543	543	99	21st	96	66	12th	63	84	83
December	·188	·199	2·2	2·3	0·6	0·5	546	548	83	13th	97	68	10th	66	91	84
Means, or totals	·246	·266	2·8	3·0	1·0	0·9	541	539	84		95	51		67	76	79

Bright Sunshine. — Temperature of Air in Sun's Rays.

Months	Greatest Daily Duration	Date	Total of Month	Per cent. of Possible Duration	Highest	Date	Mean of Highest of 19 Years	Mean	Mean of 19 Years
	hr. min.	On	hr. min.		Deg	On	Deg.	Deg.	Deg.
January	6 30	30th	19 0	8	67·9	31st	60·6	52·7	48·1
February	6 40	27th	52 55	19	78·3	28th	72·1	66·7	53·2
March	9 50	28th	99 4	27	77·2	29th	83·5	63·9	62·0
April	9 0	13th	133 56	32	83·4	4th	96·7	70·8	73·1
May	7 55	10th	78 3	16	92·6	9th	104·3	72·1	80·9
June	12 10	19th	176 50	36	104·0	18th	110·9	91·6	87·8
July	12 40	3rd	191 30	38	107·6	8th	113·7	95·9	92·1
August	11 40	15th	169 5	37	103·3	7th	110·5	89·1	89·6
September	6 35	9th	84 40	22	87·0	1st	99·3	76·1	80·5
October	7 20	26th	80 18	25	79·6	3rd	86·2	68·6	67·0
November	4 5	16th	18 50	7	67·6	6th	71·4	56·0	55·4
December	3 15	1st	10 45	7	66·0	4th	67·7	51·7	47·1
Means, or totals	8 3		1120 58	25	84·6		88·9	70·6	69·7

Wind.

Months	Direction: Relative Proportion of at 9 a.m.: N.	NE.	E.	SE.	S.	SW.	W.	NW.	Velocity at 9 a.m.: Mean	Highest	Date	Velocity during 24 hours: Mean	Highest	Date	Total Registered in Month	Pressure: Mean of all Daily Highest	Mean of all Daily Highest of 4 Years	Highest	Direction	Date	Mean of Highest of Month of 4 Years
	No.	No.	No.	No.	No.	No.	No.	No.	Miles p'r hr.	Miles p'r hr.	On	Miles per d.	Miles per d.	On	Miles	lb. per sq. ft.	lb. per sq. ft.	lb. per sq. ft.		On	lb. per sq. ft.
January	3	1	2	3	6	6	8	3	6·4	14·0	21st	148	282	22nd	4610	2·15	3·69	8·50	W	22nd	13·56
February	1	6	1	3	4	6	4	3	8·3	30·2	3rd	165	462	25th	6192	3·36	3·16	15·00	W S W	4th	11·60
March	7	3	1	6	0	1	7	6	6·8	20·4	25th	149	299	28th	4621	2·16	2·36	11·60	W	28th	12·00
April	2	7	3	2	1	6	7	2	8·7	19·6	6th	186	300	1st	5569	3·03	2·76	10·00	W	1st	10·10
May	5	10	2	2	0	1	4	7	8·0	15·2	20th	173	297	21st	5349	1·99	2·65	7·75	W N W	20th	8·94
June	2	6	4	3	4	2	4	5	6·9	14·6	9th	151	231	13th	4525	1·25	1·79	6·75	W	10th	7·19
July	4	1	2	0	4	8	10	2	7·6	12·9	13th	154	264	27th	4771	1·14	1·75	6·25	S W	28th	6·00
August	0	4	2	4	1	3	7	10	6·4	16·2	30th	131	261	9th	4064	1·26	1·77	9·60	W	10th	7·62
September	2	8	2	1	0	10	4	3	8·2	17·0	6th	162	260	3rd	4846	1·32	2·38	4·25	S W	6th	7·44
October	11	2	0	0	0	4	2	12	7·5	14·2	27th	165	296	27th	5104	1·72	2·88	5·60	S W	27th	10·81
November	7	9	1	2	0	6	6	0	6·3	20·4	1st	134	331	27th	4026	1·68	2·23	9·60	S W	27th	10·88
December	9	1	2	0	2	5	6	6	7·4	21·8	17th	160	364	17th	4967	2·45	3·61	11·00	W	17th	11·06
Means, or totals	53	58	22	26	21	57	69	59	7·4	18·0		158	303		57644	1·95	2·59	8·71			10·01

Cloud. — Rain.

Months	Mean Amount of Cloud	Number of Days it fell	Amount Collected	Greatest Daily Fall	Date	Mean of 18 Years	Mean of Seven Years ending with 1882, 65½ft. above surface of ground	Mean of 7 Yrs. endg. with 1882 at T'n Hall and Mid Rly Station on surface of ground	Gr'ter fall on surface at Town Hall & Mid Stn than at 65½ft. above surface at Exch.: Depth in Inches	Percentage of fall at Exch'ge
	0—10	No.	Ins.	Ins.	On	Ins.	Ins.	Ins.	Ins.	Per cent.
January	8·3	14	1·72	0·33	8th	2·79	2·209	2·474	0·265	11·2
February	7·8	11	0·73	0·17	1st	1·95	2·609	2·972	0·363	11·4
March	7·2	9	1·73	0·68	23rd	2·18	2·776	3·260	0·484	11·7
April	6·6	14	0·65	0·17	29th	2·08	2·516	2·835	0·319	11·2
May	7·7	15	1·51	0·69	20th	1·80	2·103	2·277	0·174	10·8
June	6·8	4	0·09	0·54	4th	2·38	2·837	3·011	0·174	10·6
July	5·8	10	1·39	0·43	27th	2·97	3·401	3·541	0·240	10·7
August	6·9	11	1·24	0·20	28th	2·53	3·654	3·892	0·238	10·7
September	7·7	19	3·51	0·67	2nd	2·93	2·894	3·229	0·335	11·2
October	7·2	13	2·13	0·81	9th	3·66	3·640	4·012	0·372	11·0
November	8·0	19	2·05	0·40	6th	2·81	3·421	3·828	0·407	11·2
December	7·6	21	1·91	0·31	7th	2·63	3·681	4·170	0·489	11·3
Means, or totals	7·3	160	16·66	0·41		29·25	35·741	39·601	3·860	11·08

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METEOROLOGY OF BRADFORD FOR 1887.

YEARLY MAXIMUM AND MINIMUM ATMOSPHERIC PRESSURE, TEMPERATURE, HUMIDITY, BRIGHT SUNSHINE, WIND PRESSURE, AND RAINFALL.

Year.	Pressure.				Temperature.								Humidity. (Complete Saturation = 100.)				Bright Sunshine.			Wind Pressure.		Rain.				Snow.	
	Highest.		Lowest.		In Shade.				In Sun's Rays.		Lowest.		Highest.		Lowest.		Greatest Daily Duration.	Date.	Total of Year.	Highest.	Date	Total for Year.	Mean Yearly Daily Amount.	Greatest Daily Fall during Year.	Date	Last and First Snow of Season.	
	Reading of Barom. during Year.	Date.	Reading of Barom. during Year.	Date	Highest.	Date	Date of Last Frost.	Date of First Frost.	Highest.	Date.	Lowest.	Date	Degree of Humidity during Year.	Date.	Degree of Humidity during Year.	Date										Date of Last Snow.	Date of First Snow.
	Ins.		Ins.		Deg.				Deg.		Deg.		0—100		0—100		hr. min.		h. min.	lb. per sq. ft.		Ins.	Ins.	Ins.			
1869	30 290	Dec. 6	28 500	Feb. 1	85·2	Aug. 30	19·8	Dec. 28	Mar. 27	Oct. 20	127·7	Aug. 30	99	Feb. 8	42	Sep. 24										April 3	Oct. 19
1870	30 294	Jan. 19	28 398	Jan. 8	88·0	July 25	18·6	Dec. 23	Mar. 30	Nov. 8	127·5	July 25	98	Jan. 29	40	July 14						0 820	June 18	Mar. 24	Nov. 15		
1871	30 162	Mar. 28	28 398	Jan. 16	84·0	Aug. 12	6·7	Jan. 1	April 11	Nov. 13	128·7	July 17	98	July 7	43	Nov. 2						0 985	June 16	Mar. 15	Nov. 18		
1872	30 168	April 6	28 070	Jan. 24	89·4	July 23	24·8	Mar. 27	Mar. 27	Nov. 19	124·8	Aug. 19	100	Mar. 22	45	Sep. 23						2 490	June 19	May 11	Nov. 12		
1873	30 338	Feb. 18	28 022	Jan. 20	89·8	July 23	19·2	Feb. 24	Mar. 14	Nov. 5	124·5	July 23	100	Dec. 11	41	Mar. 26						1 200	Aug. 4	April 25	Jan. 3,'74		
1874	30 476	Mar. 6	28 278	Dec. 11	89·9	July 20	15·0	Dec. 31	Mar. 12	Nov. 11	129·8	July 20	100	Feb. 6	42	May 18						0 740	Dec. 7	May 8	Nov. 28		
1875	30 305	July 7	28 464	Nov. 10	89·0	Aug. 17	13·0	Jan. 1	Mar. 22	Nov. 26	122·0	July 5	100	Jan. 23	43	July 6						1 700	Nov. 15	Mar. 12	Nov. 9		
1876	30 300	Jan. 15	28 070	Dec. 4	87·6	July 17	23·0	Jan. 9	April 15	Nov. 9	125·6	July 16	99	Oct. 4	46	May 6						1 810	Oct. 9	April 12	Nov. 8		
1877	30 358	Oct. 6	28 360	Nov. 29	89·0	June 19	29·0	Mar. 1	May. 4	Oct. 18	116·4	June 18	100	Oct. 28	35	May 23						1 420	July 18	May 19	Oct. 15		
1878	30 320	Mar. 16	28 345	April 1	89·6	July 18	13·9	Dec. 28	April 6	Nov. 9	118·2	July 22	99	Jan. 13	53	Aug. 9						1 220	Aug. 14	April 1	Nov. 6		
1879	30 352	Dec. 13	28 500	Feb. 10	84·4	July 30	13·2	Dec. 7	May 1d	Nov. 14	101·2	Aug. 13	100	Oct. 7	51	Dec. 12						1 020	June 6	May 7	Nov. 20		
1880	30 332	Jan. 7	28 154	Nov. 16	81·3	Sep. 5	29·6	Jan. 20	Feb. 23	Oct. 23	112·0	Aug. 13	99	Dec. 15	59	May 30						1 710	Oct. 27	Mar. 2	Oct. 27		
1881	30 382	May 10	28 250	Oct. '4	83·3	July 6	12·0	Jan. 26	April 21	Oct. 17	118·5	June 1	98	Oct. 14	38	May 31						1 435	Oct. 13	April 20	Oct. 29		
1882	30 544	Jan. 18	28 452	Mar. 1	77·4	Aug. 12	18·8	Dec. 11	April 10	Nov. 12	108·0	Aug. 9	99	Nov. 5	36	May 18						1 808	Dec. 6	Mar. 28	Nov. 19		
1883	30 500	April 8	28 462	Sep. 2	76·2	July 3	19·8	Mar. 10	Mar. 29	Nov. 12	107·6	May 17	99	Dec. 26	30	April 9						1 338	Sep. 26	Mar. 24	Nov. 10		
1884	30 394	Oct. 6	28 376	Jan. 27	84·4	Aug. 12	28·6	Nov. 30	April 24	Nov. 24	107·8	Aug. 9	98	Jan. 23	30	May 22				24 00	Jan. 24	1 176	Jan. 23	Feb. 28	Nov. 23		
1885	30 273	May 14	28 400	Jan. 11	82·2	July 27	22·1	Dec. 11	April 5	Nov. 10	113·6	July 27	100	Jan. 23	32	June 4				12 25	Dec. 4	1 226	Dec. 4	Sep. 3	Nov. 8		
1886	30 355	Nov. 24	27 652	Dec. 8	79·5	July 3	17·4	Mar. 7	April 30	Dec. 2	108·8	July 5	99	Jan. 12	37	May 4	11 45	July 6	851 48	19	18 00	Dec. 9	35 993			2 130	July 25	May 12	Nov. 8
1887	30 412	Feb. 10	28 278	Nov. 3	82·8	July 9	27·1	Jan. 17	April 17	Oct. 12	107·8	July 9	100	April 21	35	July 9	12 40	July 3	1170 58	25	15 00	Feb. 4	18 815			2 810	Oct. 9	May 21	Oct. 14
Means	30 341		28 291		87·6		18·1		117·1		99		99		40		12 12		988 71	22	17 08		30 872	39 601	3 860	11 08	1 379			

EXPLANATION.

The observations are made at nine a.m. and, with the exception of maximum and minimum thermometer readings, again at three p.m.

The highest and lowest barometric readings for each month, also the monthly range, are given as recorded; while the mean pressure is deduced from bi-daily observations corrected for index error, capillarity, temperature, and diurnal range. To correct for altitude or reduce to sea level the air temperature being 46 degrees and barometer 30 inches at sea level), add ·401 inch to the heights given.

A remarkable instance of barometric depression occurred on the 8th December, 1886, when at 8·40 p.m. the mercury of the Exchange barometer had fallen to 27·456 inches only—the lowest reading on record here. The cyclone indicated by this depression was the cause of great loss of life and property, extending over an unusually large district.

All thermometric observations and deductions are given in degrees Fahrenheit.

The adopted mean temperature of air is deduced from the dry bulb and the maximum and minimum readings; the temperature of evaporation from the dry and wet bulb and the maximum and minimum readings. The dew point, elastic force of vapour, humidity, &c., are deduced from bi-daily readings of the dry and wet bulb hygrometer, by Glaisher's Hygrometrical Tables, sixth edition.

The sunshine is recorded in hours and minutes by glass sphere on cards fixed on Professor Stokes' sidereal frame.

The solar thermometer has a black bulb enclosed in a vacuum.

The direction, velocity, and pressure of wind are recorded as indicated by anemometers fixed 10½ feet above the ridge of roof of Exchange. The velocity per hour at 8 a.m. is determined from anemometer readings made one minute and a half before and a like period after that hour, by multiplying the difference thereof by 20. The pressure is given in pounds avoirdupois per square foot.

The amount of cloud is estimated by a scale ranging from 0 to 10.

The rain gauge is fixed upon the top of central roof of the Exchange, at an elevation of 85½ feet above the surface of the ground and 395 feet above mean sea level. As rain gauges on the summit of buildings are generally found to collect less rain than when placed upon the surface of open ground adjacent thereto, steps were taken in 1875 to determine to what extent this was the case with the Exchange rain gauge, when two additional gauges were provided and fixed upon the surface of adjacent open spaces, one near to the Town Hall, the other near to the Midland Railway station, between which the Exchange gauge is situate about midway, and the surface of ground about the same height. At both of these gauges, as well as at the Exchange gauge, daily observations were made from the commencement of 1876 to the end of 1882, a period of seven years, when the surface gauges were removed in consequence of the ground they occupied being no longer available for the purpose. The particulars of these gaugings are set forth in tables. The results show that the mean yearly rainfall on the surface of ground for the seven years ending with 1882 is 3·86 inches, or 11·08 per cent., greater than at the summit of the Exchange. The mean yearly rainfall recorded at the Exchange for the eighteen years ending with 1887 is 30·872 inches. By adding 11·08 per cent. thereto the mean normal rainfall of central Bradford for such period is found to be 34·292 inches per annum. There are good grounds for concluding that the smaller amount of rainfall collected on the Exchange—and on buildings generally—than on the surface of ground is due to the varying direction and force of wind there producing different currents and eddies, which prevent due precipitation on the top or ridge of roof where the gauge is fixed. The rainfall of 1869 was collected by a gauge placed on the ridge of outer roof of Exchange, near to the north-west corner thereof. This position not being deemed quite satisfactory, the gauge was removed at the end of that year to the ridge of central roof—the place it has since occupied. To avoid risk of inaccurate results, the rainfall of 1869 is omitted from these returns.

The instruments with which the observations are made have been verified by comparison with the standards at Kew Observatory.

Yorkshire Naturalists' Union.

President:

REV. W. H. DALLINGER, LL.D., F.R.S., Pres.R.M.S., Sheffield.

Secretaries:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.
WM. EAGLE CLARKE, F.L.S., M.B.O.U., Headingley, Leeds.

THE SIXTY-FIRST MEETING

WILL BE HELD AT

ASKERN,

For the Investigation of the Neighbourhood of Campsall, Barnsdale, Shirley Pool, Owston, Burghwallis, Norton, Askern, etc.,

On THURSDAY, MAY 20th, 1886.

Railway Arrangements.

Through return tickets at pleasure party rates (single fare or fare-and-quarter for double journey) will be issued at all Yorkshire stations on the G.N., H.&B., L.&Y., L.&N.W., M.S.&L., Midland, and N.E. Railways, which have booking arrangements for Askern (L.&Y.), Moss (N.E.), or Kirk Smeaton (H.&B. line), to Members and Associates of the Y.N.U., producing their signed card of membership. Moss station is one mile E. of Askern, Kirk Smeaton station two miles N.

Members and Associates starting from stations which have not through booking arrangements, should book to the most convenient junction, and re-book to Askern, Moss, or Kirk Smeaton, at the reduced fare for both portions of the journey.

Members in other counties wishing to attend should inform the secretaries thereof, in order that railway facilities may be obtained for them.

Routes.

Permission to visit their estates is granted by Messrs. F. Bacon Frank, of Campsall Hall; G. B. C. Yarborough, Campsmount; Captain Anne, Burghwallis Hall; P. S. Neville, Shelbrook Park; and P. Davies Cooke, Owston Hall.

Two parties are arranged to leave Askern Station at 10 a.m., viz:—

I. To Campsall Woods and Barnsdale.

II. To Shirley Pool, Owston Woods, etc., in charge of the Rev. F. H. Allen.

Books and Maps.

The country for investigation is in Sheets 87 N.E. and 87 S.E., 1-inch Ordnance Map (both can be had geologically coloured). Lankester's 'Account of Askern and its Mineral Springs' (1842), contains a sketch of its geology (pp. 34—50, with coloured map), botany (pp. 50—57), and zoology (pp. 54—72). It is surprising to find that but little has been since done at so popular a resort, and Lankester's work is made the basis of this circular. What later information there appears to be at pp. 212, 220, 374 of Davis and Lees' 'West Yorkshire.'

Geology.

Mr. J. W. Davis, F.S.A., etc., states as follows:—Askern is situated at the eastern extremity of the Upper Magnesian Limestone. At the railway station, and for a short distance towards the town, the limestone is hidden beneath alluvial deposits of laminated clays and warps. Beyond the town the ground rises considerably towards Campsall. The Upper Magnesian Limestone extends about 1½

miles to the western extremity of Campsall; it rests upon the Middle Red Marls exposed on Campsall Common and round Campsall Mount; these are superimposed on the Lower Magnesian Limestone which occupies the surface beneath Barnsdale. The Lower Limestone is exposed in several quarries, often near the roadside. It varies considerably in its character from a flaggy limestone, with thin beds of coloured marls, to thick irregular beds of yellow limestone, which are soft as a rule, but are occasionally hard and crystalline. A number of fossil mollusca have been found in the quarries further south, but in this neighbourhood fossils are either absent or have not been recorded.

The Middle Marls are not often exposed except in water courses, but their presence is generally indicated, when not too thickly covered with drift, by the red and wet soil and the springs thrown out at their junction with the limestone above. They consist of red and variously coloured marls, with occasional sandstones and beds of gypsum. The Upper Limestone may be seen in a quarry half-a-mile north of Askern; it is thinly bedded, hard, flaggy, and of a grey or yellowish colour. It is fossiliferous, containing *Axinus dubius* Sch. and *Myallina hausmannii* Goldf.

Near Askern to the S.W. a large section is exposed of Estuarine beds. The boulders forming these have probably been derived from glacial clays during a submergence of the land. The beds exposed are about sixty feet thick. At the base is a bed of sandy clay, above this a bed of nearly pure sand, and then a considerable thickness of more or less rounded gravel, mainly derived from the rocks in the neighbourhood. The mass is current bedded, and sand, pebbles, and larger boulders are intermingled without any arrangement.

The flat lands of Askern Common are to a large extent marshy and contain numerous peat-beds, full of stumps of trees amongst which have been found antlers of red deer; remains of lacustrine origin are plentiful. In the fields a little eastward of the town the ground two or three inches below the surface is composed of the mud of an old lake, which contains innumerable shells of land and freshwater mollusca of the genera Limnæa, Planorbis, Bythinia, Valvata, Zua, Helix, etc.

Botany.

It will be of interest to cite the plants mentioned by Dr. Lankester in his 1842 list, with the view of confirming or correcting his observations. We therefore arrange his records by routes, marking by * those species mentioned by Lees at p. 374 of 'West Yorkshire.'

Route I.—At Campsall—*Cerastium arvense, Œnanthe pimpinelloides* (these two at Askern also), *Ribes rubrum, Pastinaca sativa, Lonicera caprifolium, Fedia dentata*, and **Carex stricta*; in Campsall Park—**Saxifraga tridactylites, Papaver somniferum, Hesperis matronalis, Silene noctiflora, Medicago sativa, *Astragalus glycyphyllos, *Viburnum lantana, Lactuca virosa, Chlora perfoliata, Salix oleifolia, Muscari racemosum*, and *Brachypodium pinnatum*; in Campsall Lane—*Lolium arvense*; in Campsall Fish-pond—*Salix aquatica*; in Campsall Woods—**Rhamnus catharticus, *Lysimachia vulgaris*, and *Salix cinerea*; in Campsall Ditches—*Lemna gibba* and *L. polyrrhiza*; Cornfields near Campsall—**Bupleurum rotundifolium* and **Linaria elatine*; on the roots of beeches in Camps Mount and Campsall Parks—**Monotropa hypopitys*; in Camps Mount Park—**Geranium pyrenaicum* (rare), **Bromus erectus* and *B. racemosus*; in woods near Camps Mount—*Ribes alpinum*; and on the road from Askern to Barnsdale—*Calamintha nepeta.*

Route II.—At Shirley Pool—**Typha angustifolia* and *Ranunculus lingua* (rare); in Sutton field—*Calamintha officinalis*; in Woods near Sutton Common—*Thalictrum minus*; between Sutton and Askern—*Onobrychis sativa* and *Silaus pratensis*; Meadows between Sutton and Campsall—**Ophrys apifera* and **Colchicum autumnale.*

Askern, etc.—Askern Pool—*Utricularia minor* and great profusion of *Chara hispida*; Askern—*Sanguisorba officinalis* (abundant), *Eriophorum angustifolium*, and *Orchis pyramidalis*; Askern Bogs—**Parnassia palustris* and *Anagallis tenella* (both rare); Meadows near Askern—*Rhinanthus major*; Askern Lanes—*Hyoscyamus niger*; between Askern and Moss—*Galeopsis versicolor* and *Viola lactea*; Ditches near Norton—*Helosciadium repens*; Norton Common—**Pinguicula vulgaris*; Norton—*Avena fatua*; River Went—*Sagittaria sagittifolia*; abundant in hedgerows—**Bryonia dioica*; roadsides, abundant—*Dipsacus fullonum*; abundant—**Sison amomum*, **Viscum album, Campanula glomerata, Galeopsis ladanum, Acinos vulgaris, Prim. elatior*, **Hottonia palustris*, and *Tamus communis.*

FERNS.—Very scarce; *Polypodium vulgare, Aspidium filix-mas, Asplenium trichomanes, A. ruta-muraria*, & *Scolopendrium vulgare* are all Lankester observed.

FUNGI.—*Peziza coccinea*, abundant in Owston Woods ; Truffles, exceedingly plentiful ; the Giant Puffball, known to attain three feet in circumference in Campsall Park ; *Phallus impudicus*, very abundant in many woods.—Lankester, 1842.

Entomology.

Lepidoptera.—In 1842 Lankester stated that the Silver-spot, Pearl-border, Silver-stripe, and other Fritillaries are seen in the plantations around Sutton Common ; the Peacock, Painted Lady, Red Admiral, and Large Tortoiseshell, in Campsall Park ; the Azure Blue and the Common Blue on the Mount and in the fields leading to Sutton ; and the Ringlet, Orange Tip, Brimstone, etc., were abundant throughout the neighbourhood.

Mr. Geo. T. Porritt, F.L.S., adds :—For so popular a resort as Askern it is surprising how little is known of its natural history. It is believed to be very rich entomologically, though the belief doubtless arises from its resemblance and proximity to Doncaster, a district which has been well worked with marked results. The date of the excursion is too early for many lepidoptera to be found, but the Doncaster list, as given in the 'Yorkshire List,' may be taken as a basis of what may be expected to occur at Askern. Species already recorded for the district include *Smerinthus ocellatus*, *Cossus ligniperda*, *Eriogaster lanestris*, *etc.*

Coleoptera.—*Dyticus marginalis* in great numbers ; the Glow-worm scarce, but has been taken near Stapleton ; Burying-beetles common, especially on the bogs ; the very rare *Diaperis ænea* once taken by H. Denny from the trunk of an old tree near the pool ; *Scolytus destructor* attacks all felled timber. —Lankester.

Other Insects.—*Nepa cinerea* very common ; Aphis-galls or monstrosities noted on Smooth Tare, Speedwells, and Ground-Ivy ; an acre or two of ground at the west end of Sutton Common, near the village, entirely covered with Ant-hills one to two feet high, and two to four in circumference ; *Vespa britannica* nests commonly.—Lankester, 1842.

Micro-Zoology and Botany.

It is fortunate that the first meeting after the formation of the new Section, '*G*—Micro-Zoology and Botany,' should be in a district so well suited to its researches.

The ditches and ponds abound with Algæ ; the Pool, a rich depository, presents a constant succession of them with the changing seasons ; *Frustulia olivacea*, *Zygnema*, *Ulva bullosa*, or bladder-laver, floating about in summer like green jelly, and two or three species of *Confervæ*, are mentioned.—Lankester.

The ponds and ditches, abounding as they do in vegetable matter, are very favourable to the developement of infusoria, both polygastrica and rotifera. In 1841 Dr. Lankester found *Plumatella repens* in Campsall Lake, adhering to the stones at the edges, and spreading in a radiate manner over their entire under-surface. He refers to a pink or rose-coloured deposit on the sand and mud at the bottom of Askern Pool, which he considers to be the bodies of dead animalcules, and which deposit is only found in waters impregnated with sulphuretted hydrogen. After referring to the numerous species of worms and leeches, Dr. Lankester states that the *Gordius* [*aquaticus*] is often seen, and looked upon by the simple-minded as a horse-hair come to life.—Lankester, 1842, pp. 59—61.

Crustacea.—Many species ; the ditches abound with the freshwater Shrimp, and several microscopic species : one of these, *Monoculus conchaceus* Don., frequently collects in such quantities as to give a yellowness to the water. In the summer of 1841 Lankester observed the surface of a pond near Campsall Hall, which presented an almost orange colour ; as he passed round it the shades of colour varied very much ; this arose from his having disturbed the animals, and from their consequently retiring deeper into the water. Among them is often found *Monoculus quadricornis*. *Argulus foliaceus* was common during the same summer.

Rev. F. H. Allen mentions the following :—**Askern Pool and Effluent Drain**—*Cosmarium margaritiferum*. *Cocconema lanceolatum*, *Diadesmis confervacea*, *Diatoma vulgare*, *Nitzschia sigmoidea*, *Sphinctocystis solea*. *Synedra splendens*, *Actinophrys sol*, *Aspidisca lynceus*, *Coleps hirtus*, *Icthydium podura*, *Kerona mytilus*, *Phialina viridis*, *Stylonichia histrio*, *Urostyla grandis*, *Uvella virescens*, *Vorticella nebulifera*, *Rotifer vulgaris*. **Pool, belonging to Mr. Townsend**, of the South Parade Baths, Askern—*Lepadella emarginata*, *Lindia torulosa*. **Haywood and Wrancar Drain**—*Batrachospermum*, *Closterium* (varieties of), *Fragillaria capucina*, *Gomphonema acuminatum*, *Meridion circulare*, *Nitzschia sigmoidea*, *Amœba diffluens*, *Chætonotus larus*, *Dileptus folium*, *Cyclops*. **Shirley Pool**—*Loxodes*

bursaria, *Stentor mulleri*, *Pterodina patina*. **Pond in Four-Acre Glebe Field,** belonging to Rev. F. W. Peel, between Owston and Burghwallis—*Plumatella repens*. **Thorpe Brick Yard Pond** (disused)—*Volvox globator* (in abundance), *Pediastrum boryanum*, *Canthocamptus minutus*, *Himantophorus charon*, *Trachelocerca viridis*, *Melicerta* (cases in abundance), *Stephanoceros eichornii* (once).

Conchology.

Dr. Lankester's 1842 shell-list was as follows :— *Paludina vivipara*, Madder Close ; *P. contecta*, ditches near Askern Pool (now extinct) ; *Bythinia tentaculata* and *B. leachii*, Askern Pool ; *Helix aspersa*, very common ; *H. hortensis*, Campsall, rare ; *H. nemoralis* and *H. hispida*, common ; *H. rufescens*, lanes near Askern ; *H. virgata*, roadsides, common ; *H. rotundata*, *Zonites nitidulus*, *Z. lucidus*, *Z. crystallinus*, and *Z. purus*, Campsall Woods ; *Succinea putris* and *S. pfeifferi* (*? elegans*), Askern Pool ; *Zua lubrica* and *Vertigo edentula*, Campsall Woods ; *Limnæa stagnalis*, ditches ; *L. auricularia*, Askern Pool ; (*L. peregra* not mentioned) ; *Carychium minimum*, Campsall ; *Vitrina pellucida*, Campsall Woods ; *Ancylus lacustris*, Campsall Lake ; *Planorbis corneus*, *P. carinatus*, and *P. marginatus*, Askern Pool ; *P. imbricatus*, Campsall Lake ; *Sphærium corneum* and *Pisidium amnicum*, Askern Ditches.

Vertebrate Zoology.

Mammalia.—The Polecat, Weasel, Stoat, Fox, Hare, Rabbit, Mole, Hedgehog, Long-eared and Noctule Bats came under Lankester's observation. Of the last-named nine were taken from an old tree at Sutton. The Squirrel at one time lived in great numbers on the beech trees at Campsall, but now [1842] seldom if ever seen there. The common species of Shrews and Mice are plentiful, also the Brown Rat and Water Vole.—Lankester, 1842.

Birds.—Campsall Hall was formerly the residence of Mr. Neville Wood, by whom 102 species were noted there—and 10 more were observed near Askern by Mr. Mellor. The species selected for mention by Lankester were :—Golden Eagle (one shot at Campsall), Rough-legged Buzzard (shot at Askern), Long-eared Owl (common in Campsall Park), Marsh Harrier, Hen Harrier, Reed and Grasshopper Warblers, Lesser Whitethroat, Brambling, Lesser Redpole, Nutcracker [?Nuthatch], Green Sandpiper (all at Campsall, rare), Nightingale (Owston Woods), Garden Warbler, Wood Wren, Longtailed Titmouse (all common at Campsall), Wood Lark (Campsall, rather uncommon), Cirl Bunting (one shot near Campsall), Hawfinch (Askern), Crossbill (Burghwallis and Campsall, thought to breed, but the fact not well authenticated), Hooded Crow, Green Woodpecker (both rare), Great Spotted Woodpecker (occasionally seen), Roller (two shot near Askern), Golden Plover (rather common), Heron, Crested Grebe, Bean Goose, Little Grebe (Askern, scarce), Solitary Snipe (Sutton Common), Whistling Swan (Campsall Lake), Shoveller (Askern Pool), Black-throated Diver (two shot on Askern Pool), Common Teal, and Wigeon (Askern—not uncommon).—Lankester, 1842.

Reptiles.—Ringed Snake, frequent in the fields on the limestone hills ; Blindworm and Viper, rare ; Frog and Toad, numerous ; Common Lizard, rather scarce ; Warty Eft or Newt in large numbers in a pond at Campsall, but never observed in the pool at Askern.—Lankester, 1842, p. 68.

Fish.—The most numerous is the Rudd or Red Eye (*Leuciscus erythrophthalmus*). The Roach (*L. rutilus*) is next to it in abundance, and sometimes confounded with it. The Dace (*L. vulgaris*) in Campsall Lake in small quantity. The Carp-bream (*Abramis brama*) plentiful there. A smaller species, the White Bream (*A. blicca*), still more numerous there, Lankester conjectures to be young *A. brama*. The Perch (*Perca fluviatilis*) has been taken of a very large size from Askern Pool, and in point of frequency is next to the Rudd and Roach. The Pike (*Esox lucius*) is found both at Campsall and Askern ; one taken in the Pool weighed upwards of 20 lbs. The Broadnosed and Sharpnosed Eels (*Anguilla latirostris* and *A. acutirostris*) inhabit Campsall Lake. The ditches and pools abound with Sticklebacks of four species (*Gasterosteus aculeatus*, *G. trachurus*, *G. semiarmatus* and *G. pungitius*). The Bullhead or Miller's Thumb (*Cottus gobio*) is in only one locality—a brook at Norton.—Lankester, 1842, p. 67.

Programme of Meetings.

5- 0—Meat Tea, 2/- each
5-45—Sectional Meetings
6-30—General Meeting

All in the Large Room attached to the Swan Hotel, Askern.

Yorkshire Naturalists' Union.

President :

REV. W. H. DALLINGER, LL.D., F.R.S., Pres.R.M.S., Sheffield.

Secretaries :

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.
WM. EAGLE CLARKE, F.L.S., M.B.O.U., Headingley, Leeds.

THE SIXTY-SECOND MEETING

WILL BE HELD AT

BRIDLINGTON

FOR

FLAMBOROUGH HEAD,

Danes' Dyke, the Caves, Robin Lythe's Hole, Flamborough, Buckton, and Bempton Cliffs,

On WHIT-MONDAY, 14th JUNE, 1886.

Railway Arrangements.

Through return tickets at pleasure party fares (single fare or fare-and-quarter for double journey) will be issued at all Yorkshire stations on the G. N., H. & B., L. & Y. L. & N. W., M. S. & L., Mid. and N. E. Railways, which have booking arrangements for Bridlington or Flamborough, to Members and Associates of the Y.N.U. on production of their signed card of membership.

Members and Associates starting from stations which have not through booking arrangements, should book to the most convenient junction, and re-book to their destination; the reduction of fare will be granted for both portions of the journey.

Routes.

Permission has been granted by Mrs. Cottrell Dormer and the Rev. Yarburgh Lloyd-Greame for members to visit their estates.

All parties will drive from the station at 10 a.m., and return from Flamborough at 3 p.m. The conveyances will be provided by Messrs. Baxter and Harland; return fare 1/9. Conveyance accommodation will be engaged *only* for those ordering from the secretaries.

High water 2-50 p.m.

I.—Geological: In charge of Rev. E. M. Cole and Mr. G. W. Lamplugh.

II.—A party, accompanied by Mr. W. Crowe, jun., of Flamborough (who will be provided with ropes and other requisities for cliff climbing).

III.—A party will investigate the Danes' Dyke, which—being sheltered—affords, perhaps, the best field of investigation for naturalists generally.

The District

appointed for investigation is that portion of the headland of Flamborough which lies East of the Danes' Dyke.

Books and Maps.

The whole district is in Sheets 95 S.E. and 94 N.E., 1-inch Ordnance Maps (which are both to be had geologically coloured). Further information on geology is given in Phillips' Geology of the Yorkshire Coast, Cole's Geological Rambles in Yorkshire, and Blake's Chalk of Yorkshire (Proc. Geol. Ass., Jan., 1878). For Vertebrate Zoology, reference may be made to Clarke and Roebuck's Handbook of Yorkshire Vertebrata and Cordeaux's Birds of the Humber District, in both of which numerous captures of rare birds and marine fishes are on record.

Geology.

The Rev. E. Maule Cole, M.A., writes;—Viewed from Bridlington Quay, Flamborough Head presents a long low line of white chalk cliffs, capped with boulder clay, stretching out to sea some six miles, and affording a safe protection against storms from the N. or N.E. The shore-line of what is known as Bridlington Bay, composed of boulder clay, is rapidly receding from the attacks of the waves; in fact, the sea is regaining what it has lost. For, previous to the Great Ice Age, the sea occupied all the area now called Holderness, and the ancient cliff ran inland in the direction of Burton Agnes, Craike Hill, and Hessle. A mile north of the Quay, on approaching Sewerby, this ancient cliff may still be traced trending landward, covered more or less with rain-wash and sand, wherein the bones of mammals of the Pleistocene age have been disinterred.

The south face of the chalk of Flamborough Head is pretty uniform, probably because little exposed to heavy storms, but immediately on turning the corner and facing N. and N.E., the chalk is broken up into caves, coves, and columns. The force of the waves, aided by the tremendous artillery of stones and sand, has cut, bored, and polished the rocks as if done by machinery. The chalk on the S. and N. side of Flamborough Head is very different in many ways. On the south side it is comparatively soft, though not nearly so soft as in the South of England, and fairly fossiliferous. The beds about Danes' Dyke (an ancient British entrenchment extending from shore to shore, piled up on the top of a natural ravine) are formed of the upper flintless chalk, and contain a great quantity of sponges, chiefly *Ventriculites,* and a number of *Marsupites*, and the characteristic belemnite, *Belemnitella mucronata.*

The flints (nodular and tabular) begin to come on on turning the extreme corner of the Head. The chalk becomes harder and the fossils more rare. Here, as at Danes' Dyke, may be seen traces of a pre-glacial valley, filled in with Boulder Clay, which, in its turn, is being rapidly denuded. In Selwick Bay, commonly called Silex Bay (though the former spelling is probably the correct form), a mass of Blue Speeton Clay has been stranded, as a boulder, on the top of the Chalk, and an interesting fault occurs, long known to Messrs. Mortimer and Cole, and recently described by Mr. G. W. Lamplugh.* Further on, towards the North Landing, the King and Queen rocks

* Proceedings of the Yorkshire Geological Society, 1880.

are met with, detached from the parent mass, similarly to the Needles off the Isle of Wight. The cliffs are capped with Boulder Clay, which has weathered into thin edges, running seawards, like Striding and Swivel Edge on Hèlvellyn. On both sides of the North Landing and all about Great and Little Thornwick, the Chalk Cliffs have been hollowed out into numerous caves and arches, and present coast scenery which can scarcely be rivalled elsewhere. From the latter point the cliffs gradually rise in height till they attain an elevation of upwards of 400 feet at Bempton. Here they are as nearly vertical as possible, and are apt to produce vertigo in the inexperienced traveller. Should he fall over he might have the doubtful consolation of being borne up by the wings of seabirds, which swarm in all directions on the narrow ledges of the chalk below.

Half-a-mile beyond the northern end of Danes' Dyke, which cuts off from the mainland the promontory of Flamborough, probably the Ocellum Promontorium of Ptolemy, occur the magnificent contortions, which form the subject of the photographs issued this year by the Yorkshire Geological Society. The beds of chalk are crushed and tilted in all directions, and show evidence of tremendous lateral pressure. Similar phenomena may be observed on a smaller scale at Foxholes, Weaverthorpe, Linton, and a few other places on the Wolds.

Botany.

As with many districts of East Yorkshire, the botany of Flamborough is but imperfectly known. The Rev. W. C. Hey has noticed *Armeria maritima*, *Parnassia palustris*, *Orchis mascula*, *O. pyramidalis*, *O. maculata*, *O. morio*, *Chrysanthemum segetum*, *Plantago maritima*, *Centaurea scabiosa*, *Petasites fragrans* (an escape, no doubt), *Viola odorata*, *Equisetum maximum*, *Asplenium adiantum-nigrum*, etc.; and Mr. E. A. Peak has noticed in addition *Beta maritima*, *Silene inflata*, *Orchis ustulata*, *Habenaria viridis*, *Sedum acre*, *Cochlearia officinalis*, *Atriplex babingtonii*, *Helianthemum vulgare*, *Caucalis nodosa*, *Spergularia marina*, and *Ophioglossum vulgatum*. Mr. Hey also notes that the neighbourhood is very rich in lichens, the Ramalinas on tree trunks being singularly fine, due no doubt to the frequent presence of mist in the air. There is also a nice variety of mosses in the damp lanes near Bempton. These lower groups of plant life have not however been well investigated.

Entomology.

Coleoptera.—The Rev. W. C. Hey writes: The list is so long that only a few species characteristic of the district can be enumerated. *Philonthus xantholoma* and *Loricera pilicornis* often swarm under seaweed. The local *Nebria livida* is common in June near Sewerby Cliffs, where another marine species occurs — *Broscus cephalotes*. Occasionally the beach is almost alive with such species as *Coccinella 11-punctata*, *Gastrophysa polygoni*, *Anchomenus parum punctatus*, and many others, thrown over the cliffs by a land-wind. Bridlington is famous for its *Amaras* and *Dyschirii*. The scarce *Ischnomera melanura* occasionally turns up, breeding no doubt in the old timbers common at all seaside localities. All the ordinary Pterostichi and Bembidia are present in great force. Ponds are fairly productive in species of *Haliplus* and *Agabus*. In fact any form of collecting will prove remunerative in favourable weather.

Lepidoptera.—Nothing appears to be known as to the lepidopterous fauna of Flamborough headland, but there is little doubt that the Danes' Dyke and the little sheltered nooks of the cliffs harbour many species of interest.

Conchology.

The Rev. W. C. Hey, M.A., writes that he has explored the Flamborough district pretty thoroughly for land and freshwater shells. It is very rich in individuals, and moderately so in species. Of *Helix aspersa*, vars. *exalbida* and *conoidea* occur by the road to Bridlington Quay. *H. rufescens* abounds; the white variety used to occupy a part of Danes' Dyke. *H. virgata*, *H. caperata*, *H. ericetorum*, and its white variety occur near chalk pits, &c. *H. cantiana* frequents Bempton lanes. *H. nemoralis*, *H. hortensis*, and *H. hybrida* abound in many handsome varieties. *Bulimus obscurus*, *Clausilia rugosa*, *Pupa umbilicata*, are at Speeton and Flamborough. Succineas abound in wet places near the cliff, chiefly in small forms. *Zonites cellarius*, *Z. alliarius*, and *Z. radiatulus* are in copses. *Limnæa glabra* abounds in grassy pools near Danes' Dyke. *L. palustris* is common, but small, except at Bridlington. *Ancylus lacustris* and *Planorbis albus* are in ponds near the cliff, the latter very fine. *P. corneus* and *P. nitidus* are perhaps not nearer than Bridlington. *Physa fontinalis* is a prevailing species. *Limnæa peregra* is grand in Buckton Pond. The arboreal habits of *Helix nemoralis*, during the pairing season, may at times be well seen in Danes' Dyke (*vide* Rimmer's Land and Freshwater Shells, page 118).

Vertebrate Zoology.

Birds.—The cliffs of Flamborough, north of the headland, are noted as the most extensive and densely inhabited breeding resort of sea-fowl in England. Guillemots, Puffins, Razorbills, and Kittiwakes nest in countless multitudes, and are this season reported as more numerous than ever, and this vast nursery will be seen to its greatest advantage on the day of the meeting. Mixed with these are numerous Rock and Stock Doves, Jackdaws, Starlings, and House Martins, a few Carrion Crows, Kestrels, and Swifts. On the broken ground on the margin of the cliffs south of the headland the Rock Pipit is a common species.

Marine Fishes.—The rock-pools harbour numerous littoral species of Gobiidæ, Blenniidæ, &c., and at various times numerous rare forms, including abyssal and pelagic species, have been captured off the headland or cast ashore in its numerous small bays.

Marine Zoology and Botany.

The Rev. W. C. Hey writes that the marine shells include *Fusus gracilis* and *F. antiquus*, *Murex erinaceus* (dead only), *Pholas crispata* (near Danes' Dyke), *Chiton marginatus*, *Saxicava rugosa*, *Trochus cinerarius*, and *T. tumidus*, &c.; and that seaweeds are fine and numerous, *e.g.*, *Chylocladia articulata* (Robin Lythe's Hole), *Rhodymenia jubata*, *R. palmata*, *Nitophyllum lauratum*, *Himanthalia lorea*, *Delesseria sanguinea*, *D. alata* (on *Laminaria*), *D. hypoglottis*, *Griffithsia setacea*, &c.

Programme of Meetings.

4-0 —Tea, 2/- each
5-0 —Sectional Meetings
5-30—General Meeting

All at Draffin's North Shore Pavilion, Bridlington Quay.

[Postponed from July 10th on account of the General Election.]

Yorkshire Naturalists' Union.

President:

REV. W. H. DALLINGER, LL.D., F.R.S., Pres.R.M.S., Sheffield.

Secretaries:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.
WM. EAGLE CLARKE, F.L.S., M.B.O.U., Headingley, Leeds.

THE SIXTY-THIRD MEETING

WILL BE HELD AT

PATELEY BRIDGE,

For the investigation of

UPPER NIDDERDALE,

How Stean, Middlesmoor, Lofthouse, Goydon Pot, etc.,

On SATURDAY, July 17th, 1885.

Railway Arrangements.

The usual railway arrangements have been made.

Routes.

Conveyances will leave Pateley Bridge for Middlesmoor (distance eight miles, return fare 2/-) immediately on the arrival of the train from Harrogate (9.45 a.m.), and will arrive at Middlesmoor about 11 a.m.

A number of local gentlemen will accompany the members, and parties will be formed for various places—such as How Stean Beck, Goydon Pot, &c.

Permission is granted by Messrs. Metcalfe and Yorke for members to visit their estates.

The conveyances will return from Middlesmoor at 3 p.m.

Conveyance accommodation can only be *engaged* for those who definitely intimate their intention of being present.

Books and Maps.

The whole of the district for the day's investigation is comprised within Sheet 97 S.E., One-inch Ordnance map, which may be obtained geologically coloured. For geological and botanical information, reference may be made to Davis and Lees' 'West Yorkshire,' and to Lucas' 'Studies in Nidderdale.' A comprehensive account of the Zoology appears in 'The Naturalist' for the current month, and in Lucas's 'Studies.'

Physical Features.

Upper Nidderdale, one of the most secluded and sequestered of the Yorkshire dales, is closed in at the dale-head by a sweep of mountain wall which for nearly forty miles attains a continuous and unbroken elevation of more than a thousand feet, and on Great Whernside reaches its maximum altitude of 2,310 feet. The physical configuration of the dale shares the general uniformity of its geological structure, which is for the most part millstone grit, except for the very limited tracts where the most easterly outcrops of the mountain limestones occur. At the dale-head the mountain pastures sweep down in broad grassy declivities or slopes from the summit ridge to the river banks, and some portion of the watershed is capped by undulating plateaux of heatherland much broken up by peat-ravines. Down the mountain pastures trickle the innumerable rills which by their union form the head-waters of Nidd and its tributaries. The river, which rapidly acquires force and volume from the numerous tributary streams which feed it, runs a course due east for about six miles before turning southward. About Angram it is margined by numerous escarpments of shale of considerable height, and fringed by a slight growth of wood and coppice. The outcrop of mountain limestone above Lofthouse is the cause of beauty and picturesqueness in the scenery of the dale and of its chief tributary, the How Stean Beck, the lower part of whose course lies through a deep and imposing gorge in the limestone, the remarkable scenery of which can hardly be excelled for grandeur and interest. Two miles above Lofthouse the river Nidd disappears entirely, precipitating itself into the pot-holes called Manchester Hole and Goydon Pot, to reappear in volume below Lofthouse after a subterranean course of a couple of miles in extent. Not that the visible bed of the stream is dry throughout, for the feeders from the mountain slopes are sufficient to keep the stream running above ground as well as below.

Geology.

Mr. B. Holgate, F.G.S., furnishes the following :—As we approach Lofthouse a thick mass of impure limestone gives rise to the cañon and waterfall in How Stean Beck. This is a very good example of the manner in which a stream by the act of running through it wears down limestone quicker than the action of the weather upon the surrounding surface, and thus cuts through the rock a water-course with vertical sides. We have also here an example, in the case of the manner in which underground streams cut their way through limestone. In the Blayshaw beck to the left of this, the beds of limestone may be seen to form waterfalls or rapids, and a little way up the stream a tramway brings one to the quarry where the well-known encrinital marble is got from, of which so many mantel-pieces are made.

Returning to the main course of the Nidd, we find it issuing from a hole in the rock beneath the bridge which we cross before entering Lofthouse. Notwithstanding that its main course is free and open the river disappears in the Goydon Pot Hole, some distance higher up, and it is only when the rains are so heavy that this underground river cannot carry off the water that the old river bed on the surface carries off the water.

The whole of the valley is full of hummocks of Glacial Drift, left as the glaciers receded at the close of the glacial period. The district in the neighbourhood, from the variety of the physical geology, as well as of fossils, is perhaps as interesting to the geologist as any spot of equal area in Yorkshire.

Botany.

In 'West Yorkshire,' p. 295, Mr. F. Arnold Lees writes:—For the higher parts of Nidderdale but few rare plants have been recorded. The florula is of the usual gritstone type. *Mimulus guttatus* has naturalised itself by the stream in a lonely situation near Ramsgill, and *Primula farinosa* is reported from Lofthouse. For the rest, the following list includes the more interesting species that grow in the district from the N.E. slope of Great Whernside to Dallowgill and Sigsworth Crags:—*Trollius europæus*, *Polygala depressa*, *Orobus tenuifolius*, *Rosa mollissima*, *Rubus Chamæmorus*, *Vaccinium vitis-idæa*, *Trientalis europæa*, *Pinguicula vulgaris*, *Empetrum nigrum*, *Potamogeton ericetorum*, *Lycopodium selago*, *Dicranella squarrosa*, *Oligotrichum hercynicum*, *Hedwigia ciliata*, *Hypnum uncinatum*, and *Neckera crispa*. In addition to these Lucas records several species, including *Arctostaphylos uva-ursi* on Little Whernside.

Entomology.

No professed entomologist appears ever to have investigated the upper part of the dale, and nothing is known of its entomological fauna beyond the names of such species as Mr. Storey has collected and sent to Leeds. Amongst them are *Vanessa cardui*, *Satyrus janira*, *Anthocharis cardamines*, *Chortobius davus* (on the moors), *Acherontia atropos* (several instances), *Hepialus sylvinus*, *H. velleda*, *H. humuli*, *Pœcilocampa populi*, *Bombyx rubi* (very common on the moors), *B. callunæ* (on the moors), *Saturnia carpini* (common on Heathfield, Pateley, and Bramham Moors), *Metrocampa margaritata*, *Amphidasis betularia*, *Fidonia atomaria* (abundant on the moors), *Himera pennaria*, *Cheimatobia boreata*, *Larentia cæsiata* (Pateley Moors and Brimham Rocks), *Emmelesia decolorata*, *Cidaria populata*, *Tanagra chærophyllata*, *Acronycta rumicis*, *Charæas graminis*, *Caradrina cubicularis*, *Phlogophora meticulosa*, *Anarta myrtilli* (abundant on the moors), *Abrostola urticæ*, *Plusia iota*, and *Hypena proboscidalis*.

It would be interesting to confirm the reported occurrence of *Chortobius davus* on the moors. Other insects whose capture would repay the investigator are the very scarce *Gastropacha ilicifolia*, which once occurred on the Dallowgill Moors, part of the Nidderdale watershed, and *Dasypolia templi*, which it is surmised from circumstantial evidence has occurred, or may occur, in the Scotgate Ash or other quarries in the neighbourhood of Pateley.

Conchology.

The most striking characteristic of the molluscan fauna of Nidderdale, imperfectly studied as it has been, is the almost total absence from it of freshwater species, the ubiquitous *Limnæa peregra* being the only one as yet recorded for the dale. The Nidderdale area is one of rapid and impetuous streams, and hardly offers scope anywhere for standing waters of sufficient permanence to attract many

species. Of land shells thirty-two species, and of slugs seven species have been noted, and there are doubtless various forms still to reward further investigation. The almost uniform geological structure of the district as a whole does not tend to the nourishment of molluscan life, but the limited outcrops of mountain limestone at How Stean and above Lofthouse impart a new element to the district, the effect of which is seen in the presence of such species as *Helix lapicida*, *H. rupestris*, *Balea*, and *Clausilia laminata*, all of which, as well as other species, are in Nidderdale confined to the calcareous element in the soil.

Vertebrate Zoology.

Mammals.—This class of the fauna has received much attention and few districts have better lists, especially in bats, one of which, the Lesser Horse-shoe Bat, here finds its northern British range. The mammalian list includes twenty-five species now to be found in the region ; among others the Long-eared Bat, Natterer's Bat, Whiskered Bat, Noctule Bat, Pipistrelle Bat, Shrew, Water Shrew, Otter, Badger, Squirrel, Dormouse, Long-tailed Field Mouse, Water and Field Voles, Red Field Vole, &c. The Harvest Mouse is recorded, but it is desirable that further information concerning its occurrence should be obtained. The Marten and the Polecat are among the species of the past, although the latter may still survive.

Birds.—The avifauna of the upper portion of the Valley of the Nidd is extremely rich in residents and summer visitants, no less than ninety species breeding annually within its limits. This special feature of true ornithic wealth is doubtless due to the great variety of habitat afforded, and also to the secluded nature of the district. But while the region affords almost every description of physical feature, it is wanting in lakes and mountain tarns, and thus many migratory waders and winter visitants among the ducks are absent from the former. The total avifauna, so far as it is known, comprises one hundred and twenty-three species ; of these, sixty-two are residents, twenty-eight are summer visitants, eleven winter visitants, and twenty-three are casual or periodic visitants, and more or less rare. Among the residents the Goldfinch, Hawfinch, Crossbill, Lesser Spotted Woodpecker, Teal, and Woodcock are worthy of mention. Of the summer visitants the more important are the Pied Flycatcher, the Wryneck, and the Dunlin.

Fishes.—The ichthyology of the upper waters of a mountain river is never rich, and the Nidd appears no exception to the rule. The Bull-head, Minnow, Loach, Trout, Grayling, Eel, and Lampern are all that are known to occur. Mr. Yorke, some few years ago, introduced many young Neuchatel Trout into the river about Ramsgill.

Programme of Meetings.

4-0 —Tea, 2/- each
4-45—Sectional Meetings
5-15—General Meeting

All at the King's Head Hotel, Pateley Bridge.

Yorkshire Naturalists' Union.

President :

REV. W. H. DALLINGER, LL.D., F.R.S., Pres.R.M.S., Sheffield.

Secretaries :

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.
WM. EAGLE CLARKE, F.L.S., M.B.O.U., Headingley, Leeds.

THE SIXTY-FOURTH MEETING

WILL BE HELD AT

PICKERING,

For the Investigation of

NEWTON DALE,

ON

Bank-Holiday Monday, August 2nd, 1886.

Railway Arrangements.

The usual railway arrangements have been made.

Routes.

1. GEOLOGICAL.—The Rev. E. Maule Cole, M.A., will leave Levisham Station at 11-18 a.m., for the Hole of Horcum and Winny Neb, returning to Levisham Station in time for the 3-52 p.m. train for Pickering. Total distance, seven to eight miles.

2. GENERAL.—Members will work leisurely up the valley from Pickering to Levisham, a distance of about six miles, returning by the 3-52 p.m. train from Levisham Station ; or, if preferred, members can take the morning train to Levisham Station, and work *down* the valley to Pickering.

Books and Maps.

The valley to be investigated is all contained in Sheets 96 N.E. and 96 S.E. of the One-inch Ordnance Map. The Hole of Horcum is just over the border of Sheet 96 N.E., and is shown in Sheet 95 N.W. All these sheets are to be had geologically coloured. For further information on botany, reference may be made to J. G. Baker's classic work on 'North Yorkshire.'

Physical Geography and Geology.

The Rev. E. Maule Cole, M.A., writes :—There are five grand dales carved by the rainfall out of the southern slopes of the great East and West anticlinal which forms the summit of the moorlands, viz. : Bilsdale, Bransdale, Farndale, Rosedale, and Newtondale. Of these the first and the last have cut completely through the water-

parting to the corresponding northern dales. The rain which falls on Fen Bog flows off partly to the Eller Beck and Esk on the north, and partly to the Pickering Beck and Derwent on the south. Pickering Beck has excavated the beautiful valley of Newton dale, which may be divided for our purpose into two portions; the lower portion extending from the town of Pickering to Levisham station, a distance of six miles; the upper reaching from Levisham to Cragstone Rigg, a distance of five miles. The lower portion cuts through the beds of the Middle Oolites which dip to the south at a greater angle than the bed of the stream, and consequently are exposed in regular order. At the mouth of the Dale there is a fault, running east and west, which throws down the Middle Oolites and brings them into juxtaposition with the Kimmeridge Clay of the Vale of Pickering. Along this line are numerous springs of water. On both sides of the valley, immediately beyond the town of Pickering, there are extensive quarries. At the top is the Upper Calc. Grit, with curious branching forms like fucoid stems. This is succeeded by some sandy shales, resting on a bed of limestone called "throstler," similar to the cement-stone of the supra-coralline beds of North Grimston. Lower down is a narrow band of Coral Rag, and then some forty feet of Coralline Oolite, full of *Chemnitzia*. Lower still is a fine development of the Middle Calc. Grit, which appears in an attenuated form at Filey Brigg. It contains the well-known *Trigonia* beds. Below this again are the Lower Limestones and Lower Calc. Grit resting on the Oxford Clay of the valley bottom. Some of the Oolitic grains in places attain the size of pisolites.

On ascending Newton dale these various beds are passed through in the order given, till at Levisham station the Lower Calc. Grit has risen from the valley bottom to the top of the hills on either side, and forms the bold escarpment of the Tabular Hills facing the north.

The second portion of the Dale is now reached. Its conspicuous feature is the grand display of Kelloway sandrock which, whilst forming the vast flat platform on which the Tabular Hills rest, presents in section, on either side of the valley, a precipitous wall of rock, resting on a well-marked line of Cornbrash limestone, supported by the sloping sides of the Upper Sandstones of the Lower Oolites. The whole valley is beautifully wooded, and the beck meanders at its sweet will, leaving many traces behind of previous wanderings. No boulder clay is met with anywhere. The rocks are just as the rain and floods, and subaërial denudation generally have left them. One thing is clear. The northern escarpment of the Tabular Hills is slowly retreating, and must once have extended to the summit of the anticlinal, for all the streams running southwards cut it at right angles, not unlike the rivers flowing from the Weald through the chalk downs. Some day the Hole of Horcum will be open to the north. At present it is shut in by a thin wall of rock on that side, whilst the interior, half a-mile across, is excavated after the appearance of a vast amphitheatre, through the Lower Calc. Grit and Oxford Clay, down to the Kelloway, which forms its bottom. The Lower Calc. Grit itself presents also fine examples of the cutting action of sand and water, in many precipitous ravines which resemble on a small scale the cañons of Colorado.

Above the Hole of Horcum is a promontory, 950 feet above sea-level, called Winny Neb. From this a grand view of the Wolds,

Tabular Hills, and moorland may be obtained, reaching from the coast to the Hambleton Hills. Close by is a singular outlier, resembling a vast tumulus, 200 feet high, called Blakey Toppin, said to have been a sacred hill among the Druids. On the opposite side of the valley, on the edge of the steep escarpment, lie the Roman Camps of Cawthorne, still perfect, but much obscured by recent planting.

Botany.

Mr. M. B. Slater supplies the following notes:—The town of Pickering is situated at the southern slope of the limestone hills, to the north of the vales of the Rye and Derwent, and stands upon the banks of the Newtondale stream, just where it leaves the limestone. To the north and east of it are ranges of limestone hills, with some well wooded slopes and intervening dales. The following list comprises some of the rarer plants, which have been recorded from the district in Baker's 'North Yorkshire':—*Trollius europæus*, *Aquilegia vulgaris*, *Corydalis claviculata*, *Astragalus hypoglottis*, *Hieracium cæsium*, *Carduus eriophorus*, *C. heterophyllus*, *Marrubium vulgare*, *Orchis pyramidalis*, *Neottia nidus-avis*, *Habenaria albida*, *Ophrys muscifera*, *Gagea lutea*, *Convallaria majalis*, &c. On the higher ground in the upper part of the streams, are some wide tracts of heathery moorland with its distinctive flora. About eight miles to the north-east of Pickering is the remarkable glen called the Hole of Horcum, where the rare montane plant, *Cornus suecica*, grows; it is found in the Scotch Highlands, but finds here on this ridge of moorland its only English locality. On the adjacent moors may also be got *Erica tetralix*, *E. cinerea*, *Calluna vulgaris*, *Trientalis europæa*, *Vaccinium myrtillus*, *V. vitis-idæa*, *V. oxycoccos*, *Myrica gale*, and *Empetrum nigrum*. The following ferns may also be met with in some of the upper glens of the streams and woods:—*Polypodium phegopteris*, *P. dryopteris*, *Cystopteris fragilis*, *Aspidium aculeatum*, *Lastrea oreopteris*, *L. filix-mas*, *Athyrium filix-fœmina*, *Asplenium trichomanes*, *A. adiantum-nigrum*, &c.

Lepidoptera.

Mr. John Braim, of Pickering, supplies the following notes:—The Butterflies are well represented in the district. I have collected thirty-four species and seen *Vanessa antiopa* and *Colias edusa* on the wing. *Anthocharis cardamines* is common. The fritillaries are in strong force; *Argynnis paphia*, *A. aglaia*, *A. adippe*, *A. euphrosyne*, *A. selene*, *Melitæa artemis*, and *Nemeobius lucina* abound generally. All the Vanessidæ are met with, viz., *Vanessa C-album*, *V. urticæ*, *V. polychloros*, *V. antiopa*, *V. io*, *V. atalanta*, *V. cardui*. *Lasiommata ægeria*, *L. megæra*, *Hipparchia semele*, *H. janira*, *H. tithonus*, and *H. hyperanthus* are abundant in suitable seasons. Mr. Sewell reports *Chortobius davus* on the summit of the watershed. *Thecla rubi* is the only Hairstreak taken, but others will no doubt occur. The Blues, *Lycæna ægon*, *L. agestis*, *L. alexis*, *L. alsus*, and *L. argiolus*, with the Skippers, *Thanaos tages*, *Hesperia sylvanus*, and *H. linea* are plentiful.

Judging from the list of Butterflies, the great variety of food-plants, and the diversity of country, consisting of moor and woodland, bogs and sheltered valleys, there is evidently a rich harvest waiting for an ardent collector of moths, but so far they have been neglected. The

following species have been observed :—the Forester (*Ino statices*), with the 5- and 6-spot Burnets (*Zygæna loniceræ* and *Z. filipendulæ*), *Smerinthus ocellatus*, *S. populi*, *Acherontia atropos*, *Chærocampa elpenor*, *Macroglossa stellatarum*, *Sesia bembeciformis*, *S. tipuliformis*, all the Hepialidæ, *Cossus ligniperda*, *Cerura bicuspis*, *C. furcula*, *Notodonta dromedarius*, *N. ziczac*, *N. dodonea*, *N. dictæa*, *Diloba cæruleocephala*, *Clostera reclusa*, Buff Tip (*Pygæra bucephala*), and Goldtail (*Porthesia auriflua*), *Euthemonia russula*, and the three Tigers (*Arctia caja*, *A. plantaginis*, and *A. fuliginosa*), two Ermines (*Spilosoma menthastri* and *S. lubricipeda*), *Euchelia jacobeæ*, *Bombyx rubi*, and *B. quercus*, *Eriogaster lanestris*, *Pœcilocampa populi*, the Drinker (*Odonestis potatoria*), and Emperor (*Saturnia carpini*), with *Cilix spinula*, among the Sphinges and Bombyces. In the Geometræ *Ourapteryx sambucata*, *Eurymene dolabraria*, *Nyssia hispidaria*, *Amphidasis prodromaria*, *Hemerophila abruptaria*, and several of the genera Boarmia and Tephrosia are common. *Asthena blomeraria*, *Abraxas ulmata*, and about twenty of the genus Eupithecia have been noticed. *Melanippe*, *Anticlea*, *Cidaria*, and *Eubolia* are well represented. The Noctuæ have not been worked at all, but many good things have turned up. *Thyatira batis*, *Cymatophora flavicornis*, *C. ridens*, *Polia flavocincta*, *Dasypolia templi*, three of the *Dianthœciæ*, *Plusia interrogationis*, and *P. iota*, with many others of the different families. The Plume moths are numerous.

Conchology.

Nothing appears to be on record except *Helix aspersa*, unusually fine on the Castle Hill, Pickering, but the district being well wooded and on a calcareous soil, may be expected to be very productive.

Vertebrate Zoology.

Mr. John Braim supplies the following notes :—Mammalia.—The following species have come under my observation : The Common, Long-eared, Horse Shoe(?) and Noctule Bats ; Water and Field Shrews, Field and Water Voles, Dormouse, Long-tailed Field Mouse, Hedgehog, Mole, Badger, Fox, Weasel, Stoat, and Otter.

Birds.—One hundred and twenty-six species have been recorded, of which sixty are residents, thirty summer visitants, ten winter visitants, and twenty-six accidental visitants. Many species that bred regularly formerly are now occasional visitants only, as the Peregrine, Buzzards, Hen and Montagu's Harriers, Raven, &c. The most interesting residents are the White and Long-eared Owls, Dipper, Cole, Marsh, and Long-tailed Tits, Gray Wagtail, Tree Sparrow, Green Woodpecker, Creeper, Kingfisher, &c. Those arriving in spring include Merlin, Ring Ouzel, Grasshopper Warbler, Lesser Whitethroat, Wood Warbler, Goatsucker, Great Plover, &c. The Woodcock has been observed breeding twice of late years.

Fish.—The river Costa and Pickering Beck, with some large ponds near, supply the under-mentioned species : Trout, Grayling, Pike, Loach, Eels, Minnow, Roach, Dace, Perch, Chub, Burbot, Gudgeon, Miller's Thumb, Lamprey, and Stickleback.

Programme of Meetings.

4-15—Meat Tea, 2/- each
5-15—Sectional Meetings
5-45—General Meeting

All at the Black Swan Hotel, Pickering.

Yorkshire Naturalists' Union.

President:
SIR RALPH PAYNE-GALLWEY, Bart., M.B.O.U., Thirkleby Park, Thirsk.

Secretaries:
WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.
WM. EAGLE CLARKE, F.L.S., 18, Claremont Road, Headingley, Leeds.

THE SIXTY-SIXTH MEETING

WILL BE HELD AT

SALTBURN-BY-THE-SEA,

ON

WHIT-MONDAY, May 30th, 1887.

Railway Arrangements.

Through return tickets at pleasure party fares (single fare or fare-and-quarter for double journey) will be issued at all Yorkshire stations on the G.N., H. & B., L. & Y., L. & N. W., M. S. & L., Mid., and N. E. Railways, which have booking arrangements for Saltburn-by-the-Sea, to Members and Associates of the Y.N.U., on production of their signed card of Membership.

Members and Associates starting from stations which have not through booking arrangements, should book to the most convenient junction, and re-book to their destination; the reduction of fare will be granted for both portions of the journey.

The Districts

appointed for investigation are (1) The valley of the Skelton Beck, a small stream running from Guisbrough to Saltburn, and (2) the line of coast from Kettleness to Staithes and Saltburn.

Routes.

Permission has been granted by Lord Zetland for members to visit his estates in the Skelton valley.

I. GEOLOGICAL.—The Rev. E. Maule Cole, M.A., will lead a party of geologists along the coast from Kettleness to Staithes. The party will leave Kettleness Station on the arrival of the 12-4 train ftom the south, and will proceed to Saltburn by the 4-34 train from Staithes Station. Walking distance about five miles.

II. Most members will find the valley of the Skelton Beck, from Guisbrough to Saltburn, worth exploration. Distance about six miles. Those who prefer to work the valley downwards may take train from Saltburn to Guisborough at 8-10, 9-15, or 11-40 a.m.

Low Water will be at 3-30 p.m.

Books and Maps.

Sheet 34 new one-inch ordnance map (104 S.W. old ordnance map), is also published geologically coloured. Baker's 'North Yorkshire'; Phillips' 'Geol. Yorks. Coast'; Ferguson's 'Nat. Hist. Redcar.'

Geology and Physical Geography.

The Rev. E. Maule Cole, M.A., supplies the following notes :— Saltburn is situated at the mouth of one of the beautiful ravines carved out by the becks descending from the Cleveland Hills towards the north and east. In a hollow of the hills a couple of miles to the east of Guisbrough lay an ancient lake. The peaty ground is drained by a beck called Spa Gill, which eventually reaches Saltburn under the name of Skelton Beck. At its exit from the old lake is Slapewath, i.e., slippery ford. On the opposite side another beck flows north-east, called Saltburn Beck, and joins Skelton beck close to Saltburn town, cutting off a mass of boulder clay, known as Cat Nab.

West of Saltburn there is a flat uninteresting plain, covered now with boulder clay, but to the south and east is beautiful scenery, due to the geological formation. The cliffs from Sandsend to Saltburn are composed of different members of the Lias, and at Rockcliff attain the highest elevation in England, over 680 feet. A large portion of these are capped with Oolitic sandstone, which stretching inland as far as Roseberry Topping, rises to a height of nearly 1100 feet. We are speaking only of the moors north of the Esk. The central portion of the moors traversed by the high road from Whitby to Guisbrough is composed of hard Kellaways rock, lying on the top of the above-named Oolite estuary sandstones, and forming an outlier. It is gradually being denuded by the rainfall, as are the oolitic sandstones on which it rests. The water percolating through these attacks the soft shales of the Lias, and causes innumerable landslips, besides hollowing out ravines in all directions. The harder beds, such as the *A. margaritatus*, form crags and terraces on the side of the hills.

Near Saltburn are some forty iron mines worked in the Cleveland main seam, which occurs in the *A. spinatus* zone of the Middle Lias. It is estimated that there are 200 square miles of workable ironstone in the district between Eston and Grosmont.

The geological party will start from Kettleness on Runswick Bay. The view looking across this lovely bay to the quaint old cottages perched on the side of the opposite cliff is very charming and picturesque. Descending the cliff a mile of sand has to be crossed, flanked by crumbling cliffs of boulder clay, filling up a pre-glacial valley. The scar on the north side of the bay belongs to the *A. serpentinus*, or jet zone, where the aptychi of ammonites are said to be plentiful, though we must confess never to have found one. This zone makes way shortly for the *A. annulatus* zone, consisting of sandy, micaceous 'grey shales,' as far as the south side of Brackenberry Wyke. Here many nodules may be seen containing the ink-bag of the belemnite, the guard or osselet lying exposed in the shale. Particular attention is called to this fact, as the inkbag is elsewhere rarely found, whereas the guard by itself, the Belemnite fossil, or thunderbolt, is common everywhere in the Secondary rocks.

At Old Nab, on the north side of Brackenberry Wyke, the *A. spinatus* zone, the main seam of the Cleveland Ironstone, puts in an appearance, at first forming a terrace at high water mark, 21 feet thick, and then mounting the cliff till over Staithes it attains a height of 150 feet. The *A. margaritatus* zone now occupies the scars, and

also forms the lower part of the cliff between Old Nab and Staithes. The doggers in this zone, about midway, are very fossiliferous. At Staithes there is a considerable fault; the beds on the north are thrown up, so that the *A. margaritatus* zone forms the summit instead of the bottom only of the cliff, and the *A. serpentinus*, which at Rosedale Wyke formed the scars, is soon 375 feet high in Rock-cliff. From Staithes to Boulby the cliffs are capped with Boulder Clay, which creeps up and covers a large portion of the surface towards the central moors. From Saltburn to Redcar there is a fine stretch of sand, with low boulder clay cliffs; whilst at Redcar itself may be seen at low water some Lias scars of the *A. bucklandi* zone.

Botany.

Messrs. T. F. Ward and M. B. Slater inform us that a list of the rarer plants growing in the neighbourhood of Saltburn is given in Baker's 'North Yorkshire,' and that Ferguson's 'Natural History of Redcar' also contains a good list of the rarer plants of that district. The present season is a late one—therefore only the early flowering plants may be expected to be met with. The following comprises some which have been recorded from the district in the works just mentioned:—*Cakile maritima*, *Silene maritima*, *Euonymus europæus*, *Asperula odorata*, *Myosotis sylvatica*, *Anthyllis vulneraria*, *Vicia sylvatica*, *Prunus padus*, *Linaria cymbalaria*, *Plantago coronopus*, *P. maritima*, and *Crambe maritima*. The following are some of the rarer mosses recorded from the district: — *Fissidens crassipes*, *Dicranum fuscescens*, *Distichium capillaceum*, *Gymnostomum rupestre*, *Dicranella rufescens*, *Didymodon flexifolius*, *Grimmia maritima*, *Orthotrichum tenellum*, *Aulacomnium androgynum*, *Tetradontium brownianum*, *Trichostomum tophaceum*, and *Hyocomium flagellare*. The stream which flows into the sea at Saltburn has its source near Roseberry Topping, and in its lower course flows through a fine wooded glen, which will probably be one of the best localities for plants at this early season, and it is possible some good finds in Hepaticæ would reward diligent search. Damp places on the coast cliffs are also often good localities for mosses.

Lepidoptera.

Mr. G. T. Porritt, F.L.S., whose observations on the Lepidoptera of Saltburn may be referred to at pp. 67—69 of the 'Naturalist' for March, remarks that so far as perfect insects are concerned, the date of the meeting is too early. Nearly all the species alluded to in that paper will be in the larval state, and members who want them can collect them in that stage. Those of the interesting and local *Pterophorus dichrodactylus* ought readily to be found in stems of tansy, which grows in abundance in a ravine not far from the Saltburn Pleasure Gardens, and those of *Agrotis valligera* and *A. tritici* will be feeding, the latter in profusion, beneath the sand along the sand-hills between Saltburn and Redcar. The Depressariæ seem well represented in the district, and it will be just the right time for well-grown larvæ of most of the species on their various food-plants. Of the two species for which we have as yet no other Yorkshire locality, *D. douglasella* and *D. weirella*, the former is said to feed on wild

carrot, and the latter on *Anthriscus*. Larvæ of *Sciaphila pascuana* and *Sphaleroptera ictericana* will be feeding in plenty in closed up flowers of *Ranunculus* and other plants.

Land and Freshwater Mollusca.

Mr. Baker Hudson furnishes the following notes :—The district would seem to be rich in land shells. On the sea banks *Helix aspersa*, *H. nemoralis*, *H. caperata*, *H. rotundata*, *H. hispida* var. *depilata*, and *Pupa marginata*, abound, but it is in the glen through which the Skelton beck winds that the collector will reap his richest harvest. The following are common :—*Helix rotundata*, *H. sericea*, *H. nemoralis*, *H. hispida*, *Zonites crystallinus* and var. *subterranea*, *Z. cellarius*, *Z. alliarius*, *Z. nitidulus*, and *Z. purus* (the var. *margaritacea* more common than the type), *Vitrina*, *Limax arborum*, *L. agrestis*, *L. lævis*, *Arion ater*, *A. hortensis*, *Zua*, *Carychium*, *Pupa umbilicata*, *Clausilia rugosa* and *C. laminata*. *H. aspersa* occurs in the gardens. Less abundant are *Helix aculeata*, *H. lamellata*, *H. pygmæa*, *H. concinna*, *H. arbustorum*, *H. pulchella* (Rev. W. C. Hey), *Zonites fulvus*, *Z. radiatulus*, *Vertigo edentula*, *V. pygmæa* (Rev. W. C. Hey), *Bulimus obscurus*, and *Azeca*. I have taken *H. hortensis* very sparingly, higher up the glen, above Skelton mill, and Mr. Hey informs me that *Vertigo pusilla* and *V. substriata* occur in the neighbourhood of Guisbrough. *H. fusca* occurs in 'Tockets' at the high end of the glen near Guisbrough. *Limnæa peregra* is the only fresh water mollusc I have yet noticed in Skelton beck.

Marine Zoology.

Mr. Baker Hudson furnishes the following :—Saltburn appears to be comparatively neglected as regards marine zoology; probably from the better opportunities afforded by the scars of Redcar; some good things are, however, to be had at Saltburn, such as *Clavellina lepadiformis*, under sheltered ledges, *Aplysia* on fronds of ulvæ and *Cucumaria communis* (vide Ferguson). I found *Doris tuberculata* abundantly last year, and one specimen of *Aphrodite*. The flat porcelain crab may be taken near lowest level of spring tides, and '*Galathea* is under almost every stone.' *Actinia mesembryanthemum* is here most abundant and variable, indeed Ferguson asserts that the only variety wanting is the strawberry. The littoral zone promises well and doubtless an hour or two could be well employed at low tide.

The Rev. W. C. Hey remarks that he has not found the rocks rich in shells or zoophytes. *Acmæa testudinalis* is fine. Of crustacea are to be noted *Hyas araneus* and *Porcellana longicornis*.

Vertebrate Zoology.

Unlike the well-worked adjacent districts to the East and West, the Saltburn and Staithes line of coast, and the Skelton valley and woods, although offering a promising field for research, appear to be practically unknown so far as concerns their vertebrate fauna, the only fact on record being that Cormorants breed on Huntcliffe.

Programme of Meetings.

4-30.—Meat Tea, 2/-, Gilbertson's Hotel, Milton Street, Saltburn.
5-30.—Sectional Meetings } Parochial Hall, Saltburn, kindly lent by
6-0.— General Meeting } the Rev. B. Irvin, Vicar of Saltburn.

Yorkshire Naturalists' Union.

President:
SIR RALPH PAYNE-GALLWEY, Bart., M.B.O.U., Thirkleby Park, Thirsk.
Secretaries:
Wm. Denison Roebuck, F.L.S., Sunny Bank, Leeds.
Wm. Eagle Clarke, F.L.S., 18, Claremont Road, Headingley, Leeds.

THE SIXTY-SEVENTH MEETING

WILL BE HELD AT

THIRKLEBY PARK

(By invitation of the President),

FOR THE INVESTIGATION OF

GORMIRE LAKE

And the neighbouring portion of the western escarpment of the Hambleton Hills,

On WEDNESDAY 20th JULY, 1887.

Sir Ralph Payne-Gallwey's invitation to Dinner (the possession of which is absolutely necessary, and which is in no case transferable) will be forwarded to every Member and Associate making written application to W. Cecil Scott, Hon. Assistant Secretary, Otley Road, Far Headingley, Leeds. It is requested that application be made before the 18th July, to facilitate the arrangements.

Railway Arrangements.

Through return tickets at pleasure party fares (single fare for distances over thirty miles, and fare-and-quarter for distances under thirty miles, for double journey) will be issued at all Yorkshire stations on the G.N., H. & B., L. & Y., L. & N. W., M. S. & L., Mid., and N. E. Railways, which have booking arrangements for Thirsk, to Members and Associates of the Y.N.U., on production of their signed card of Membership.

Members and Associates starting from stations which have not through booking arrangements, should book to the most convenient junction, and re-book to their destination ; the reduction of fare will be granted for both portions of the journey.

Routes.

Permission is granted by Mr. H. W. F. Bolckow for the investigation of Gormire.

Conveyances will wait at Thirsk Junction for the trains from Leeds at 9-18 a.m., from Middlesbrough at 9-34 a.m., and from York at 9-42 a.m., to convey members and associates to Gormire Lake.

Conveyance Tickets 3/6 for the whole round—Thirsk Junction to Gormire, Gormire to Thirkleby Park, Thirkleby Park to Thirsk

Junction. Accommodation will only be provided for holders of tickets obtained in advance from Mr. W. Gregson, Baldersby, Thirsk.

Geology and Physical Geography.

The Rev. E. Maule Cole, M.A., supplies the following:—Gormire Lake lies in a hollow, about half-way down the western escarpment of the Hambleton Hills. From near Thirsk to a little beyond Sutton-under-Whitestone Cliff is a three mile stretch of Lower Lias. Then the ground begins to rise, the Middle and Upper Lias forming the base of the hills. A somewhat extensive development of the Dogger rests on the Lias; then follow the Lower Estuarine Sandstones, in which may be traced a band of hydraulic limestone, occupying a lower horizon than the Millepore and Scarborough limestones of the coast sections. Immediately above the hydraulic limestone lies Gormire Lake. Its formation is probably due to a landslip. Numerous landslips occur both on the Oolitic and Chalk hills, whose western and northern fronts present a comparatively steep aspect. Ascending the cliff more estuarine sandstones of the Lower Oolites are passed, till the base of the Middle Oolites is reached, shown by a slight terrace of hard Kellaways rock. On this rest the well-known sloping sides carved out of Oxford clay, capped by the Lower Calcareous Grit, and presenting the old familiar features of the Nabs, which face north from Scarborough to Black Hambleton, only in this case forming a continuous wall.

The Chalk Wolds attain an elevation of only 800 feet. The Hambleton Hills above Gormire reach 1,050 feet, but further north at Black Hambleton a height of 1,300 feet is attained, the ground rising gradually all the way. From the top there is a splendid view over the Vale of Mowbray, and southwards over the Vale of York and the Chalk Wolds. Formerly these Oolite Hills extended far to the west. The escarpment is being gradually eaten back by subaërial denudation. The dip is towards the east, and the eastern slopes are carved into many beautiful ravines, which find their way down into the lovely valley of the Rye.

Immediately south of Thirkleby is one of the most remarkable faults in Yorkshire. The valley in which the Malton and Thirsk railway runs is due to a double fault. The northern branch runs along by Ampleforth and Oswaldkirk; the southern by Gilling; and the result has been that the solid rocks which occupied the space between Ampleforth and Gilling have been conveyed bodily some five miles to the west, and are now found between Kilburn Park and Newburgh Park. The same faults are continued westward with a similar result, the Rhætic Beds and Lower Lias, which should be south of Thirkleby, being transferred five miles off to the west of Topcliffe. The faults are continued to the west of the River Ure into the Magnesian Limestone, but do not seem to extend through it.

Botany.

Mr. W. Foggitt furnishes the following notes on some of the rarer and more interesting species which occur in the district.

Whilst awaiting the arrival of the later portion of our contingent, a few minutes will suffice to collect near Thirsk Junction, *Barbarea præcox*, *Arabis perfoliata*, *Diplotaxis muralis* and *tenuifolia*, *Medicago sativa*, *Melilotus altissima*,

Anthyllis vulneraria, *Epilobium palustre*, *Pimpinella magna*, *Poterium sanguisorba*, *Poa compressa*, *Festuca bromoides*, &c. *Erigeron acre* and *Bromus erectus* grow upon the railway embankment at a short distance, and *Typha angustifolia* occurs in an adjoining ballast hole. Between Thirsk Junction and the town *Silene noctiflora*, *Rosa villosa*, *Allium scorodoprasum*, *A. oleraceum*, and *Ornithogalum umbellatum* are found in tolerable abundance. Between Thirsk and Sutton-under-Whitstonecliffe occur *Verbena officinalis*, *Mentha piperita*, *Calamintha officinalis*, *Crepis setosa*, *Carex disticha*, and *Glyceria distans*. Beyond Sutton and climbing the hill may be seen *Geranium sanguineum*, *Poterium sanguisorba*, *Pyrus communis*, *Pimpinella saxifraga*, *Hieracium murorum*, *H. cæsium*, *Echium vulgare*, *Avena pratensis*, and *Kœhleria cristata*, whilst the bryologist is sure to notice *Gymnostomum tenue*, *Trichostomum flexicaule*, *Tortula aloides*, *T. tortuosa*, *Encalypta vulgaris*, and *E. streptocarpa*, besides many other interesting mosses. Upon the summit amongst the heather *Listera cordata*, *Habenaria bifolia*, *Lycopodium alpinum*, and *L. selago* have been gathered. Among the rocks at Whitstoncliffe *Saxifraga granulata*, *Asplenium adiantum-nigrum*, *A. trichomanes*, and *A. ruta-muraria* are found, whilst *Stellaria nemorum*, *Epilobium angustifolium*, *Myosotis sylvatica*, *Veronica montana*, *Polypodium phegopteris*. *P. dryopteris*, *Hypnum giganteum*, and *H. brevirostre* occur in the subjacent wood. Descending to Gormire, one of the largest of our Yorkshire lakes, being about one mile in circumference and occupying an area of sixteen acres, fed by unseen springs and with no visible outlet, save when swollen by rain, at which time a strong current may be seen to flow underground in the direction of Whitstoncliffe, re-issuing according to popular notion on the other side of the hill several miles to the eastward. In the water or upon its immediate sides may be found *Viola palustris*, *Comarum palustre*, *Epilobium ligulatum* (of Baker), *Myriophyllum alterniflorum*, *Hydrocotyle vulgaris*, *Helosciadium inundatum*, *Veronica scutellata*, *Mentha sativa*, *Menyanthes trifoliata*, *Lysimachia thyrsifolia*, *Littorella lacustris*, *Potamogeton lucens*, *P. heterophyllus*, *Pilularia globulifera*, and *Equisetum fluviatile*, whilst the surrounding banks yield *Gnaphalium sylvaticum*, and a number of interesting Rubi and Carices. A neighbouring pond abounds with *Peplis portula* and *Hottonia palustris*, whilst near at hand is an old station for *Artemisia absinthium*. Gintoft Gill, a small but very beautiful valley nearly three miles to the north of the lake, besides being very rich bryologically, yields abundance of *Primula farinosa*, *Trientalis europæa*, *Anagallis tenella*, *Vaccinium vitis-idæa*, *Narthecium ossifragum*, *Polypodium phegopteris*, and *P. dryopteris*.

Other 'neighbouring portions of the western escarpment of the Hambleton Hills' yield *Helleborus viridis*, *Viola lutea*. *Lathræa squamaria*, *Gentiana conpestris*, *G. amarella*, *Ophrys muscifera*, *Habenaria conopsea*, *H. chlorantha*, *Gagea lutea*, *Acorus calamus*, *Carex paniculata*, and *C. pendula*. Other mosses of this district, according to Baker's 'North Yorkshire,' are *Brachyodus trichodes*, *Anodus donianus*, *Dicranum fuscescens*, *Tortula marginata*, *Hedwigia ciliata*, *Grimmia trichophylla*, *Orthotrichum stramineum*, *O. hutchinsiæ*, *Bryum cernuum*, *B. torquescens*, *B. obconicum*, *Mnium affine*, *M. cuspidatum*, *Tetraplodon mnioides*, *Bartramia calcarea*, *Fissidens pusillus*, *Hypnum crassinervium*, *H. pumilum*, *H. tenellum*, *H. heteropterum*, *H. flagellare*, *H. pratense*, *H. depressum*, and *Neckera crispa*. The return journey will not leave much of botanical interest, but it is noteworthy that the splendid avenue of limes at Thirkleby Park includes the three species *Tilia parvifolia*, *T. platyphyllos*, and *T. vulgaris*.

Entomology.

Mr. W. Foggitt informs us that very little is known of the insects fauna of this district, seeing that Thirsk has had no resident entomologist for over thirty years, but there is little doubt of a rich harvest to a diligent collector. His own desultory and very superficial observation supplies the following :—*Pieris brassicæ*, *P. rapæ*, *P. napi*, *Euchloë cardamines*, *Hipparchia tithonus*, *H. janira*, *H. pamphilus*, *Vanessa atalanta*, *V. io*, *V. urticæ*, *V. c-album*, *Argynnis Selene*, *A. aglaia*, *Lycæna phlæas*, *Polyommatus alexis* amongst Butterflies, whilst among Moths he remembers the following :—*Smerinthus populi*, *Acherontia atropos*, *Cossus ligniperda*, *Hepialus humuli*, *Anthrocera trifolii*, *A. loniceræ*, *Chetonia caja*, *Arctia menthastri*, *Orgyia antiqua*, *Ourapteryx sambucaria*, *Rumia cratægata*, *Asthena luteata*, *Abraxas grossulariata*, *Lomaspilis marginata*, *Pygæra bucephala*, *Agrotis exclamationis*, *Triphæna orbona*, *Triphæna pronuba*, *Alucita polydactyla*, etc. Mr. John Grassham has taken the Small Blue, *Polyommatus alsus*, at Sutton-under-Whitstonecliffe.

Conchology.

In 1855 Mr. John H. Davies published in Morris' Naturalist an excellent list of the mollusca of the Thirsk district, citing the names of 7 slugs, 35 land mollusco and 23 freshwater species, or 65 in all. Of these the species which occur in the Gormire district are *Limax arborum* (near Feliskirk and Hawnby, at high elevations), *L. maximus* (Feliskirk), *Helix arbustorum* (under Boltby Scar, at 700 feet), *H. lapicida* (occasionally plentiful on the Hambleton escarpments at Boltby, Whitsuncliffe, &c.), *H. aculeata* (hedge bank near Boltby), *H. rupestris* (amongst *Encalypta streptocarpa*, house roof at Boltby), *Pupa umbilicata* (Boltby Glen), *Clausilia laminata* (near Feliskirk), *C. rugosa* (at nearly 1000 feet at Whitsuncliffe), *Limnæa glabra* (amongst duckweed in a pond halfway between Gormire and Whitsuncliffe), and *Planorbis spirorbis* (same pond, amongst horsetails).

Vertebrate Zoology.

Messrs. Robert Lee and J. B. Foggitt supply the following notes :—

The following comprises some of the rarer and most interesting Birds, which have been seen in or near Gormire and the adjacent woods :—The Common and Rough-legged Buzzards, Long-eared Owl, Sparrow-hawk, Kestrel, Merlin, Pied Fly-catcher, Dipper, Stonechat, Ring-ousel, Wheatear, Blackcap Warbler, Gold-crest, Snow Bunting, Hawfinch, Siskin, Green Woodpecker, Nuthatch, Roller (Boltby), Nightjar, Heron, Snipe, Jack-snipe, Dunlin, Coot, Mallard, Teal, Wigeon, Pochard, Little Auk, Green and Common Sandpiper, Woodcock, Shieldrake, Golden-Eye, Tufted Duck, Red-breasted Merganser, Sclavonian and Little Grebe, Red-Throated Diver, Common and Arctic Tern, Lesser Black-backed Gull, Razorbill, Cormorant.

The Hambleton Moors furnish the following :—Red Grouse, Great Plover, Golden Plover, Curlew, Whimbrel, Redshank, Short-Eared Owl, Great Grey Shrike, Grey Phalarope, Crossbill, Guillemot, Herring-Gull.

The Bittern is occasionally heard in a damp valley near Hood Hill.

In the neighbourhood of Thirkleby the following have been observed :—Kite, Waxwing, Brambling, Hawfinch, Bullfinch, Crossbill, Greater and Lesser Spotted Woodpecker, Grasshopper Warbler, Nightingale (Sessay), Siskin, Bar-tailed Godwit, Great Northern Diver (Birdforth), Gannet.

Near Thirsk the following have been recorded :—Hobby, Hen Harrier, Peregrine Falcon, Grasshopper Warbler, Crested Tit, Raven, Red-legged Partridge, Quail, Pratincole, Dunlin, Spotted Crake, Bean Goose, Red-necked Grebe, Puffin, Black-headed Gull, Great Black-backed Gull, Stormy Petrel.

In Gormire the following Fishes occur: Pike, Carp, and Perch. In the Codbeck, near Thirsk, the following have been taken :—Pike, Trout, Grayling, Chub, Roach, Dace, Perch, Gudgeon, Eel, Lamprey, Ruff, Tench, Loach, Bullhead, Minnow, Stickleback, and on rare occasions a small Salmon.

Mammalia.—Near Gormire and Rolston Scarr :—Badger, Fox, Stoat, Weasel, Brown Rat and Water-vole, Long-tailed and Short-tailed Field Mouse, Shrew, Squirrel, Hedgehog, Bat.

Near Thirsk Otters are frequently seen and two young ones, caught about twelve months ago, were kept alive for some time by Mr. Robt. Lee.

Reptiles.—Viper, Ringed Snake, Blindworm, Frog, Toad, Lizard, Newt.

Programme of Meetings.

2- 0—Conveyances leave Gormire for Thirkleby Park.
3-30—Dinner in the Riding School at Thirkleby Park.
4-30—Sectional Meetings } At Thirkleby Park.
5- 0—General Meeting }
6- 0—Grounds, Gardens, and Decoy open for inspection.
7- 0—Conveyances leave for Thirsk Junction for the 7-50 train (York), the 8-10 train (Leeds), and the 8-30 train (for the north).

The Executive wish to call attention to the prospectus of Lees' West Riding Flora sent herewith, and trust that it will receive the general support of Members and Associates.

Yorkshire Naturalists' Union.

President:
SIR RALPH PAYNE-GALLWEY, Bart., M.B.O.U., Thirkleby Park, Thirsk.
Secretaries:
WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.
WM. EAGLE CLARKE, F.L.S., 18, Claremont Road, Headingley, Leeds.

THE SIXTY-EIGHTH MEETING

WILL BE HELD AT

SEDBERGH.

For the investigation of the Howgill Fells, Cautley Spout, the Crook of Lune, and the Valley of the Rawthey,

On Bank-Holiday Monday, Aug. 1, 1887.

The Kendal Natural History Society having accepted the Union's invitation to co-operate in this excursion, will be represented by several of its Members.

Railway Arrangements.

Through return tickets at pleasure party fares will be issued at all Yorkshire stations on the G.N., H. & B., L. & Y., L. & N. W., M. S. & L., Mid., and N. E. Railways, which have booking arrangements for Sedbergh, to Members and Associates of the Y.N.U., on production of their signed card of Membership.

Members and Associates starting from stations which have not through booking arrangements, should book to the most convenient junction, and re-book to their destination; the reduction of fare will be granted for both portions of the journey.

Routes.

Parties will leave Sedbergh Railway Station at 9-17 a.m., as follows:

I. Rawtheydale, Cautley Spout, eastern slopes of the Howgill Fells, and back.—Eight miles.

II. Crook of Lune, western slopes of Howgill Fells, and back.—Seven miles.

III. GEOLOGICAL ONLY.—Viâ Millthrop, the Riggs, and over Helm Knott, and back.—Seven miles.

Geology and Physical Geography.

Mr. J. W. Davis, F.S.A., of Halifax, writes:—The district round Sedbergh is occupied by a series of high mountains composed of Silurian Sandstones, Shales, Slates and Limestones. A triangular area of Old Red Sandstone Conglomerate extends eastwards from the town, and is exposed in the bed of the river Rawthey about a mile eastwards, where the road crosses the river, resting on the edges of the Coniston Grits. The Silurian Grits differ little in character through their vast thickness, and cause scarcely any variation in the physical characters of the district. They are usually much contorted, and give rise to rounded mountain-land. The position of the great valleys by

which they are intersected is greatly due to the lines of weakness caused by the faults, the rocks in the valleys being precisely similar to those occupying the hills above, and exhibiting no features rendering them more liable to erosion. The Silurian rocks are brought to a sudden termination by the great Pennine fault on the east, and abut against the Carboniferous Limestone and Yoredale Rocks of Baugh Fell and the hills east of Dent Valley; on the west they are continuous with the mountains of Westmorland. The hills owe much of their roundness and smooth surface to glacial action. The steep slopes of Howgill Fells behind Sedbergh are covered with glacial matter consisting of a sandy clay full of scratched stones and boulders, through which the mountain torrents have deeply carved their channels.

The Silurian Rocks exposed in the immediate neighbourhood of Sedbergh are (*a*) the Coniston Limestone, (*b*) Coniston Flags, (*c*) Coniston Grits, (*d*) Bannisdale Slates. The Coniston Limestone (*a*) is brought by a north and south fault into juxtaposition with the grits (*c*) on the east side of Helm Knott. It consists of a hard blue crystalline limestone with beds of dark blue close-grained shales and slates. The limestone contains numerous fossils of the Wenlock types, of which it is here the equivalent. Amongst others Leptena, Lingula, Orthis, Trilobites, Favosites, etc. The limestone is exposed in Helm Gill and Larly Beck near Sedbergh. The Coniston Flags (*b*) may be seen at Helm Knott in a small quarry on the north side of the Hill with fossil Orthoceratites and Graptolites. They dip rapidly to the south-west, and occur again in the bed of the River Dee in several places between Dent and Sedbergh. They also occur in the River Rawthey where they dip under the Coniston Grits and form the base of Howgill Fells. The Coniston Grits (*c*) consist of tough grits and sandy slates, and are between 3000 and 4000 feet in thickness. They are largely developed in Howgill Fells north of Sedbergh; and Holme Fells, the Riggs, and Helm Knott, south and south-east, are also composed of them. They are thrown abruptly on their eastern side against the mountain limestone by the great Pennine series of faults. The lowest beds seen occur on the east side of Helm Gill, which is the line of the great fault separating the limestone from the shales and grits on the opposite side of the watercourse, and beneath the moorland above Helm Gill near Dent. The limestone is exposed where the course of the stream has been lowered for the purpose of draining the land adjoining. The beds consist of dark-blue limestone and shale and dip rapidly to the south-west, so that on descending the gill they are hid by the overlying shales and grits. They are highly fossiliferous. The Riggs are formed by an anticlinal of the Grits which are exposed in several sections; in one at Cragg's Hill Wood fossils are abundant.

Botany.

The Rev. W. Thompson, M.A., J.P., of Guldrey Lodge, Sedbergh, writes:—The meeting will be behind time for Globe Flower, Mealy Primrose, Bogbean, and Butterwort (*Trollius europæus*, *Primula farinosa*, *Menyanthes trifoliata*, and *Pinguicula vulgaris*), though the plants may be observed in their later stages. On the other hand, Grass of Parnassus (*Parnassia palustris*) will hardly be

in flower yet. Spignel (*Meum athamanticum*) grows in the higher pastures of Howgill, but it will probably be advisable to keep as near the river as practicable, as the haymakers will have denuded the meadows of much of their botanical interest. Along the course of the Lune and Rawthey should be found *Ranunculus flammula*, *Cochlearia officinalis*, *Stellaria aquatica*, *S. nemorum*, *Hypericum perforatum*, *H. dubium*, *H. quadrangulum*, *H. humifusum*, *Geum rivale*, *Agrimonia eupatoria*, *Epilobium hirsutum*, *E. montanum*, *E. tetragonum*, *Sanicula europæa*, *Œnanthe crocata*, *Angelica sylvestris*, *Galium verum*, *G. boreale*, *Solidago virga-aurea*, *Carduus heterophyllus*, *Campanula latifolia*, *Mentha aquatica*, *Teucrium scorodonia*, *Spiræa ulmaria* and *Polygonum bistorta*. The *Hieracia* are pretty numerous, and should be investigated. In the meadows *Geranium sylvaticum* will have given place to *G. pratense*, and *Orchis maculata* will be nearly over. *Habenaria bifolia* frequents some fields ; *H. albida* is much rarer. *Corydalis claviculata*, *Silene inflata*, *Potentilla comarum*, *Senecio saracenicus*, and *Plantago media* are scarce, but the Great Burnet (*Sanguisorba officinalis*) is too common. In hedgerows, Elder, Honeysuckle, and Guelder Rose will, of course, be found, and on dry ground or old walls *Barbarea vulgaris*, *Arabis hirsuta*, *Sisymbrium officinale*, *Arenaria serpyllifolia*, and *Linum catharticum*. On the slopes of Howgill Fells *Polygala vulgaris*, *Hypericum pulchrum*, *Ulex europæus*, and *Sedum anglicum* may be met with ; but the most interesting locality will undoubtedly be the neighbourhood of Cautley Spout, where on the lower ground and by Cautley Beck, may be expected *Saxifraga hypnoides*, *S. stellaris*, *Drosera rotundifolia*, *Hydrocotyle vulgaris*, and *Pedicularis sylvatica*. Nearer the Spout *Thalictrum minus* has occasionally been found. *Alchemilla alpina* here reaches its southern limit, and the Parsley Fern (*Allosorus crispus*) is abundant. The whole district is very rich in Cryptogamic forms of life.

Entomology.

In this department of research the neighbourhood of Sedbergh appears to be quite unknown country, and therefore deserving of re-rearch, even for the commonest and most generally-diffused species.

Conchology.

The Silurian slates of the Howgill Fells and of the immediate vicinity of Sedbergh are—as usual with those formations—not rich in mollusca, the only species as yet on record being *Arion ater*, *A. bourguignati*, *Limax agrestis*, *Zonites radiatulus*, *Helix hortensis* and *Zua lubrica*. A heap of lime-refuse by the bridge over the Rawthey (east of Sedbergh) yielded in addition *Zonites nitidulus*, *Helix rufescens*, *H. rotundata*, and *Clausilia rugosa*. Conchologists are likely to obtain better results if they work the lower slopes of Baugh Fell, to the east of the Rawthey stream, where the mountain limestones appear.

Vertebrate Zoology.

The following notes, by Mr. John Watson of Kendal, referring to the immediately adjacent portions of Westmorland county, may be regarded as being not inapplicable to the Sedbergh district itself:—

The Peregrine, once resident, is now only a visitant from the lake hills. The Osprey occurs on its autumnal migration on Killington Tarn, and the Buzzard is still not uncommon. The Rough-legged Buzzard is as about one in five of those shot. The Sparrow-hawk and Kestrel are common and the Merlin still breeds on the Firbank moors. The following may also be expected: Pied Flycatcher, Dipper, Ring Ouzel (exceedingly plentiful on the Fell 'becks' hereabout). The Stone and Whinchats, Sedge Warbler, Blackcap Warbler, Garden Warbler, Common and Lesser Whitethroats, Wood Warbler, Grasshopper Warbler, Willow Warbler, Goldcrest, Marsh Tit, Bohemian Waxwing (winter), Snow Bunting, Black-headed Bunting, Brambling, Siskin, Lesser Redpole, Twite, Crossbill (winter), Raven (still not uncommon), Carrion and Hooded Crows, Jay, Creeper, Kingfisher, and Nightjar (exceedingly plentiful in the coppice woods of the adjoining valleys). The moors are splendidly stocked with Red Grouse, but Black Game steadily decreasing. Quail formerly bred, but has not been seen of late. Golden Plover and Dotterel on their way to the hills. About one Bittern occurs annually. Curlew, Green Sandpiper, Woodcock, Spotted Crake, Water Rail. Wild Swans and Geese annually visit Killington—species unknown as they are rarely shot. Last winter three flocks of geese at different times. The following Ducks have been shot: Shelldrake, Shoveller, Wild Duck, Teal, Wigeon, Pochard, Common and Velvet Scoters, Golden Eye. Great-eared, Crested, and Little Grebes have all occurred. Great Northern Diver, Gannet, and Storm Petrel. It may be added that there is a Heronry at Ingmire Hall (Yorkshire) about three miles from Sedbergh, which, last time I visited it, contained seventeen nests.

All the Fell 'becks' contain Trout, and Killington Tarn Trout, Perch, Roach, Pike, Minnow, Loach, Eels, Bullhead, and Stickleback, and freshwater Crayfish in great abundance.

The Common Lizard is plentiful on the heaths, and the Blindworm in the coppice woods. Ringed Snake on boggy parts of moors; Viper, Common Frog, Toad, and Natterjack, in limestone clefts. Two species of Newts in the ditches.

Among the Mammalia are Common, Long-eared, and Notch-eared Bats, Hedgehog (up to 1000 feet), Common and Water Shrews, Mole, Polecat, Ermine, Weasel, [and Marten ?]. Otter and Fox both common. Dormouse, in coppice woods; Wood Mouse and Field Vole.

Books and Maps.

Ordnance Map (One-inch) Sheets 98 N.E. and S.E. and 97 N.W. contain the whole district of the Excursion: 98 N.E. and S.E. are to be had Geologically coloured. Davis and Lees' West Yorkshire may be consulted for Geology and Botany, and the Rev. W. Thompson has published a 'Florula Sedbergensis' giving full list of plants, and Mr. John Handley has also published notes on the plants in pamphlet form. In Zoology no lists appear to exist.

Programme of Meetings.

3-0 p.m.—Meat Tea, 2/- each } At the 'White Hart' Inn, Market
4-0 p.m.—General Meeting } Place, Sedbergh.

Yorkshire Naturalists' Union.

President:
SIR RALPH PAYNE-GALLWEY, Bart., M.B.O.U., Thirkleby Park, Thirsk.

Secretaries:
WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.
WM. EAGLE CLARKE, F.L.S., 18, Claremont Road, Headingley, Leeds.

THE SIXTY-NINTH MEETING

WILL BE HELD AT

WELTON,

For the investigation of

The Southern Extremity of the Wolds,

Including Welton Dale and Brantingham Dale, Braffords and Wauldby Woods, together with the banks of the Humber from Brough to North Ferriby,

On Saturday, August 27th, 1887.

Railway Arrangements.

Brough (N. E. R.) and South Cave (H. & B. R.) are the nearest Stations.

Through return tickets at pleasure party fares will be issued at all Yorkshire stations on the G. N., H. & B., L. & Y., L. & N. W., M. S. & L., Mid., and N.E. Railways, which have booking arrangements for Brough and South Cave, to Members and Associates of the Y.N.U. producing their signed card of Membership.

Members and Associates starting from stations which have not through booking arrangements, should book to the most convenient junction, and re-book to their destination; the reduction of fare will be granted for both portions of the journey.

Routes.

Permission has been granted by Mr. W. H. H. Broadley to visit his estates.

Members will assemble at the Green Dragon Hotel, Welton, starting thence at 10 a.m. for the round up Welton Dale through the woods on the wold, and back.

Books and Maps.

The whole district is comprised in Sheet 86, One-Inch Ordnance Map. Geology treated of in E. M. Cole's "Geology of the Hull and Barnsley Railway," and in F. F. Walton's pamphlet on the "Geology of the District between Market Weighton and the Humber."

Geology and Physical Geography.

Rev. E. Maule Cole, M.A., writes as follows :—The district selected for investigation occupies a small corner of the East Riding, between the Hull and Barnsley Railway and the Humber, at the western foot of the Chalk Wolds. From the summit of the hills, which are here comparatively low, there is a fine view of the Humber and of the great plains watered by the Ouse and Trent. To the south may be seen the Oolitic "Cliff" running parallel with the river Ancholme in Lincolnshire, and further to the east the Chalk Wolds. The escarpments are not in line with the similar beds in Yorkshire, and argue the probability of a fault in the direction of the channel of the Humber. The Yorkshire Wolds, from about Pocklington to the Humber, form a neck of high ground, separating the low lying plains of York and Holderness, and at several points beautiful views may be obtained of both plains simultaneously, with the Minsters of York and Beverley towering in their midst.

The western edge of the Wolds is comparatively steep and much indented with beautifully picturesque dales. The eastern side of the chalk dips gradually till it is lost beneath the boulder clays of Holderness. The Red Chalk, which forms here the base, may be seen at the Welton Springs, succeeded by Grey Chalk, with the usual manganese markings and without flints. At a quarry at Melton a black carbonaceous band may be seen dividing the grey from the Lower White Chalk with flints. Here it is about a foot thick, and said to contain fish bones; a little further north at a cutting at the western end of Riplingham Tunnell, the same black band was found to be a yard thick in places. It was continuous in the cutting as far as Weedley Tunnel, though thinning out westwards.

A narrow band of Liassic and Oolitic beds runs along the western foot of the Wolds. The Lias may probably be seen in the Mill Beck at Ellerker, and a quantity of gravel containing *Gryphæa incurva* is to be found in the neighbourhood. In the same beck may be seen 2ft. of hydraulic limestone belonging to the lower Oolites, such as is found about Gormire on the Hambleton Escarpment. The Millepore or Cave Oolite may easily be detected between Ellerker and Brough, having been largely quarried.

The Kellaways Sand Rock is not so good to find, though there was a fine exposure in the railway cutting near South Cave. The Coralline Oolite is wanting altogether. There are several gravel beaches and sand ridges in the neighbourhood, and in one of them some remains of the Mammoth have recently been found. On the banks of the Humber, near Melton, there is visible at low water a submerged forest, roots and trunks of trees standing in a bed of peat. Similar peat is found at Goole, and at the railway bridge of the Hull and Barnsley, across the Ouse.

Botany.

Mr. E. A. Peak, of Hull, furnishes the following list of Plants observed at Welton and neighbourhood :—*Papaver dubium*, *P. argemone*, *Sisymbrium sophia*, *Arabis hirsuta*, *Draba verna*, *Reseda lutea*, *R. luteola*, *Helianthemum vulgare*, *Viola hirta*, *Polygala vulgaris*, *Silene inflata*, *S. noctiflora*, *Cerastium arvense*, *Geranium pratense*, *Astragalus glycyphyllus*, *Spiræa filipendula*, *Fragaria vesca*, *Epilobium angustifolium*. *E. lanceolatum*, *Myriophyllum verticillatum*, *Ribes alpina*, *Saxifraga tridactylites*, *S. granulata*, *Parnassia palustris*, *Apium graveolens*, *Valeriana dioica*, *Carduus nutans*, *C. eriophorus*, *Carlina vulgaris*, *Artemisia maritima*, *Aster tripolium*, *Lactuca muralis*, *Campanula glomerata*, *C. rapunculoides* (Spout Hill), *Chlora perfoliata* (Elloughton Dale), *Gentiana amarella*, *Menyanthes trifoliata*, *Atropa belladonna* (Drewton), *Verbascum thapsus*, *Linaria elatine*, *L. minor*, *Olobanche major* (observed once only), *Calamintha clinopodium*, *C. acinos*, *Ballota nigra*, *Echium vulgare*, *Pinguicula vulgaris*, *Anagallis tenella*, *Armeria maritima*, *A. plantaginea*, *Polygonum bistorta*, *Orchis pyramidalis*, *O. ustulata*, *Gymnadenia conopsea*, *Ophrys apifera*, *Juncus maritimus*, *Carex dioica*, *C. præcox*, *Alopecurus agrestis*, *Agrostis spica-venti*, *Avena flavescens*, *Lepturus filiformis*, and *Hordeum pratense*.

Entomology.

We have not been successful in obtaining information on this subject.

Land and Freshwater Mollusca.

Mr. J. Darker Butterell furnishes the following notes :—After the extremely dry summer, it is difficult to say what is likely to turn up. In the neighbourhood of Brough, Brantingham and Welton, the following species have been found :—*Sphærium corneum*, Brantingham ; *Bythinia leachii*, near Brough ; *Planorbis albus*, pond at entrance to Welton Dale ; *P. vortex*, *P. corneus*, *Physa fontinalis*, and *L. truncatula* at Brantingham ; *Limnæa peregra*, fine, with *Planorbis albus*, *Ancylus fluviatilis*, near Brough ; *Vitrina pellucida*, *Zonites cellarius*, *Z. nitidulus*, *Z. purus*, *Z. crystallinus*, *Z. fulvus*, *Helix aspersa*, *H. nemoralis*, *H. arbustorum* and var. *flavescens*, *H. cantiana*, *H. rufescens* (in gardens), *H. hispida*, *H. virgata*, *H. caperata* and var. *ornata*, *H. ericetorum*, *H. pulchella* and var. *costata*, *Bulimus obscurus*, *Pupa marginata* and var. *edentula*, *Vertigo edentula*, *Clausilia rugosa*, *C. laminata*, *Zua lubrica*, *Achatina acicula* (on an old wall), and *Carychium minimum*, all in the neighbourhood of Brough or in Welton Dale. *Hydrobia ventrosa* is recorded as having been found on the banks of the Humber or in ditches adjoining between Brough and the out-fall of the Market Weighton canal and should be verified if possible, or at any rate well searched for between Brough and Ferriby. The banks of the Humber near Ferriby furnished the

following some years back :—*Z. nitidulus*, *H. aspersa*, *H. rufescens*, *H. hispida* vars. *subrufa* and *albida*, *H. ericetorum* and specimens agreeing with Jeffreys' measurement of var. *minor*, *H. rotundata*, *H. pygmea* at roots of furze, *B. obscurus*, and *Pupa umbilicata*.

Vertebrate Zoology.

Mr. W. L. Shooter, of Hull, remarks that he has noticed the Kestrel, Sparrow-hawk and Magpie in the Dales, together with a general sprinkling of the commoner birds, and on the Humber mud-flats between Brough and Hessle he has seen flocks of Sandpipers, Ringed Plover, Black-headed and Common Gulls, and Wild Duck. He has also seen the Lesser Black-backed and Herring Gulls in winter.

Programme of Meetings.

5- 0 p.m.—Meat Tea, 2/- each
6- 0 p.m.—Sectional Meetings
6-30 p.m.—General Meeting

All at the 'Green Dragon Hotel,' Welton.

The subscription list for the new 'Flora of West Yorkshire' is still open, and the Executive would be glad if intending Subscribers would send in their names at once to the Secretaries.

The NEXT EXCURSION will be held on WEDNESDAY, the 21st of SEPTEMBER, to HATFIELD CHACE, the Executive having decided to postpone the Fungus Foray for a year, on account of the extreme drought of the past summer, at the suggestion and on the advice of Mr. C. B. Plowright, whose experience is that a dry summer (however wet the autumn may be) is never a good fungus-year.

Yorkshire Naturalists' Union.

President:
SIR RALPH PAYNE-GALLWEY, Bart., M.B.O.U., Thirkleby Park, Thirsk.

Secretaries:
WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.
WM. EAGLE CLARKE, F.L.S., 18, Claremont Road, Headingley, Leeds.

THE SEVENTIETH MEETING

WILL BE HELD AT

HATFIELD,

FOR

HATFIELD CHACE,

On Wednesday, September 21st, 1887.

Railway Arrangements.

The nearest stations are Stainforth for Hatfield (M.S.&L.), Thorne (M.S.&L.), and Thorne (N.E.R.).

Through return tickets at pleasure party fares will be issued at all Yorkshire stations on the G. N., H. & B., L. & Y., L. & N. W., M. S. & L., Mid., and N. E. Railways, which have booking arrangements for Stainforth and Thorne, to Members and Associates of the Y.N.U. producing their signed card of Membership.

Members and Associates starting from stations which have not through booking arrangements, should book to the most convenient junction, and re-book to their destination; the reduction of fare will be granted for both portions of the journey.

Routes.

Permission has been granted by Mr. C. Wright, the Hon. Mrs. Meynell Ingram, and Mr. A. I. Wells, for members to visit their estates.

Members will assemble at Hatfield village at 10-15 a.m., and thence proceed to various parts of the Chace under the guidance of Mr. T. J. Hasselby, Mr. J. M. Kirk, and other gentlemen.

Books and Maps.

The greater part of the district is in Sheet 87 S.E., but a small portion (round Lindholme) is in Sheet 86.

The District

For investigation consists of the low-lying country which extends East and South-East from Hatfield Woodhouse as far as the Lincolnshire boundaries, and includes what remains unreclaimed of the far-famed Level of Hatfield Chace.

Physical Geography.

The physical history of Hatfield Chace is that of Goole Moor. At one time all this level from Cantley to Goole was a shallow sandy-bottomed lake, later a sandy-soiled forest of *Pinus* and Birch (and

other trees ?). Now, the peat, which is very thick, is the top layer of the alluvial strata, with the sandy forest-bed lying under it on Hatfield Moor, and the root-branches of the aboriginal forest may yet be seen *in situ* in the beds of some of the deep wide drains, if the recent wet has not filled them with water. All around the fenny plain rise up dwarfish *barfs* or bosses of Triassic Sandstone, capped with gravel at Hatfield, Ackholme Common, Woodhouse, and Hill Wroot. At Lindholme is a lake of sixteen acres extent, made by digging out the bed of the old river Don, which was warped up after Vermuyden had diverted its stream—and which is fed by springs from the White Quicksand which lies eighteen feet below the surface of the moor. On the west front of Lindholme Hall are two large stones, as to which it is uncertain whether they are glacier-borne or placed there by human agency.

Geology.

Dr. H. W. Arbuckle, of Thorne, states that geologically the district rests upon the triassic rocks, new red sandstone in the western part, red marl with bands of gypsum in the eastern part. These are however more or less covered up by a series of post-tertiary beds, the usual sequence of which, from above, is as follows :—(1) Warp, a loam deposited from the river, by natural or artificial agency ; (2) Peat, with the remains of an ancient forest at the base ; (3) Sand ; (4) Shiny laminated clay ; (5) Gravel and sand. Through the superjacent beds, the triassic rocks, capped with more recent gravels, rise here and there, forming low eminences above the level plain.

Botanology.

Mr. F. Arnold Lees supplies the following note :—' Owing, possibly, to its relative inaccessibility, and the known similarity of its soil and surface to the much larger tract of Thorne Waste with Goole Moor, the gradually encroached-upon area embraced in the term Hatfield Chace (formerly sixteen, now under nine square miles in extent), has held out so few attractions, raised such slight hopes of good ' finds,' that it has found few botanical chroniclers. I have twice crossed it myself, and the Goole Society, in Dr. Parsons' time, visited it, in both cases without turning up much that was rare or not-to-be-expected. At this late period of the year most Phanerogams will be in an advanced or seeding condition ; and probably the wide dikes draining the Chace will best repay careful examination. Pondweeds, Charas, and other aquatics should be diligently fished up, however common they look, *in situ*, to the eye, as in these a few species new to the locality, or even to the Riding, may well reward search. Freshwater algæ will be abundant, and on the peaty-sandy soil where shaded by birch thickets, or fir-trees, a fair crop of Fungi may be confidently hoped for, considering that a very dry summer militates against prevalence of this class of plants in all but normally wet localities, no matter how plentifully rain may fall at the eleventh hour. *Omphalia umbelliferus*, *Amanita muscarius*, and *Lepista nuda* are the only fungi I recollect as attracting my attention when last there, but *Lentinus tigrinus* and *Panus stypticus* have occurred just over the county border in the Isle of Axholme, near Wroot, and a sharp look out should be kept for the allied *Xerotus degener*, a dry umbrella-like little species, with a thin grey striped cap, and branched membrane-like

gills. It grows on bare turfy-peat. It is rare, but, still, is likely enough to be detected. Few mosses will be found save the common *Sphagnums* (with *S. rigidum*), *Bryum nutans*, and *Ceratodon purpureus;* but the possibility of the occurrence of *Ceratodon conicus* on sandy banks should not be forgotten. It is very like *C. purpureus*, but the capsule is erect, more regularly cylindrical, fatter, and not grooved, and the stalk of a paler red. It has been gathered nearer Sheffield.

The known 'flora' of the undrained peat bog, growing less every year as spaces on the fringe are reclaimed and become black-soiled corn- and potato-fields, is very like that of Thorne Waste, *sans* half a dozen of its on-lingering rarities. There are three or four well-marked brambles, *Rubus fissus*, *R. lindleianus*, *R. affinis*, and *R. umbrosus*, *Hydrocharis morsus-ranæ* in the ditches, and probably *Stratiotes*. *Rhynchospora alba*, *Gentiana pneumonanthe*, and *Andromeda polifolia* still survive, and in or by the 'new' Torne and Idle 'rivers' close by Tunnelpit, near Wroot, *Peucedanum palustre* and *Cladium mariscus* occur.

The Hatfield drain on the north edge of the moor should be followed to Westcar House or Frog Hall (just *over* the Lincolnshire border), keeping on the moor side of the 'old' Idle river, which should be traced down to the angle of the moor near Tunnelpit, which reached the course should then be north-west, and back across the moor by Lindholme. *Epilobium angustifolium* will be seen, perhaps one or more *Utricularia*, *Lysimachia vulgaris* and *Lastrea thelypteris*. *Osmunda* too, used to grow on the moor, in thickets, along with *Myrica gale*. A curious casual—*Potentilla hirta*—was found at Lindholme in 1878, probably it will have gone by now; but ground newly-reclaimed is, for a year or two after being cropped, apt to be prolific in certain erratic or fugitive members of our British Flora. *Rhinanthus major* Ehrh., and *Galeopsis ochroleuca*, are two of these erratic natives; both, but the first-named especially, have a way of appearing in corn- or potato-fields for two or three years after they have been reclaimed, then vanishing. A good look out should be kept, therefore, for these on the newest fields nearest the undrained bog. *Calamagrostis lanceolata* and *C. stricta* should also be watched for, the latter a narrow, graceful Reed-grass, in the boggy thickets and on hill-sides. All *Sparganium* seen in advanced condition should have its fruiting spheres examined, to determine whether *S. neglectum* Beeby occurs, or only the commoner *S. ramosum*.

The narrow-leaved, verticillate variety of *Lysimachia vulgaris* known as *angustifolia* Wats., has been gathered near Barnby, and *Galeopsis ochrolenca* thereabout also. *Hieracium umbellatum* is *the* Hawkweed, par-excellence, along with *Senecio sylvaticus*, of the low sandstone eminences and sandy lanes on the Moor's borders.

Entomology.

Little or nothing is known. Mr. F. Arnold Lees noticed *Chortobius davus* there in 1879, *Strenia clathrata*, and *Eupithecia nanata*, *Fidonia atomaria*, and, he thinks, the Ruby Tiger Moth (*Arctia fuliginosa*).

Land and Freshwater Mollusca.

Mr. W. Denison Roebuck, F.L.S., supplies the following:—There do not appear to be any records for the precise district of this excursion, which will, however, be found very productive in fresh-

water species. Some years ago the southern part of Hatfield Chace, including the River Torne and the Gravel and Black Bank drains, was searched by Messrs. J. W. Taylor, W. Nelson, W. E. Clarke, and the writer. On that occasion nearly all the *Limnæidæ* were found in profusion, and also *Paludina contecta* (one), the two *Bythiniæ*, *Valvata piscinalis*, *Pisidium nitidum*, and *P. pusillum*. Of *Limnæa auricularia* there were plenty, and single examples of *Physa hypnorum*, *Succinea elegans*, and *Zonites alliarius*, the two latter being, with the exception of *Helix nemoralis*, the only land shells observed.

Vertebrate Zoology.

In this department the district offers ample scope for investigation, the available information being but meagre. Mr. T. J. Hasselby, of Doncaster, and Dr. H. W. Arbuckle, of Thorne, inform us that the Adder, Ringed Snake and Lizard occur, and that Curlew, Redshank, Horned Owl, Mallard, Teal, Widgeon, Snipe and Plover are occasionally met with. On the lake occur Coot, various Ducks and Wild Swans have been shot, and in its waters are Pike, Perch. Bream, Roach and Eels. In a road-side brick-pond between Hatfield and Thorne are Pike, Perch, etc., and a kind of Roach called 'Bastard Bream,' a very thin fish, whose specific identity is unknown to local anglers, and which should therefore be determined. Formerly wild fowl resorted to the morass in immense numbers but are now comparatively scarce.

Mr. A. I. Wells supplies the following list of species he has met with :— Heron, various Ducks, Geese (occasional), Partridge, Pheasant, Landrail, Snipe, Blackcock (on moors), Waterhen, Starling, Magpie, Jay, Jackdaw, Rook, Carrion Crow, Sparrow-hawk, Kestrel, Merlin, Owls, Woodpigeon, Woodcock, Turtledove (occasional), Blackbird, Thrush, Fieldfare, Cuckoo, Curlew, Grey and Golden Plover, Gulls (various at times), Wren, Goldfinch, Greenfinch, Grey Linnet, Chaffinch, Blackcap, Reed-sparrow, Sparrow, Hedge-sparrow, Hawfinch, Bramblefinch and Kingfisher (at times), Swallow, Martin, Sandmartin, Swift, Woodlark, Skylark, Titlark, Robin, Flycatcher, Bearded and Long-tailed Titmouse, Wagtail, Redpole, Whinchat, and Stonechat. The Mammals are—Fox, Hare, Rabbit, Mole, Barn and Water Rats, 'Fomerd,' Stoat, Weasel, Shrew, and Barn Mice, with an occasional Dormouse. Reptiles—Adder, Common Snake, Toad, Frog, and Newt. Fish—Pike, Perch, Roach, and Bream.

Micro-Zoology and Micro-Botany.

As the district has not been much explored, it is the intention of Mr. J. M. Kirk, High Street, Doncaster, secretary of Section G, to lead a party for that purpose. Microscopists are invited to communicate with him, so that two or more separate parties may be formed for a thorough investigation of the ditches, and what is left of the peat bogs of the locality, one which will in all probability prove well worthy of attention.

Programme of Meetings.

4-30 p.m.—Meat Tea, 2/- each
5-30 p.m.—Sectional Meetings
} At the 'Blue Bell' Inn, Hatfield.

6- 0 p.m.—General Meeting.—In the Parochial Meeting-room, within the Vicarage Grounds, by kind permission of the Vicar of Hatfield (Rev. G. P. Haydon).

THE YORKSHIRE NATURALISTS' UNION: ANNUAL MEETING AT DEWSBURY.

THE twenty-fifth annual meeting, held this year at Dewsbury, on Monday, the 14th March, was a most successful one, thanks to the exertions of the members of the Dewsbury Society. There was a very large attendance of the Members and Associates from all parts of the county. By kind permission of the Committee of the Dewsbury Co-operative Society, rooms in their buildings were placed at the disposal of the Union. The proceedings commenced at 3.30 p.m., when the General Committee met in the Library for the transaction of the Union's business. The chair was occupied by the President, the Rev. W. H. Dallinger, LL.D., F.R.S., etc., and in addition to the official representatives of thirteen societies, there were present a large proportion of the officers of the Union and the permanent members of the Committee. The minutes of the preceding annual meeting having been read and confirmed, two societies which had made application—the Ackworth School N. H. S., and the Leeds Y. M. C. A. Nat. Club — were unanimously admitted into the Union. The election (also unanimous) as new Members of the Union, of Mr. W. W. Booth (Leeds), Mr. John H. Bromley (Leeds), Rev. Canon J. Ingham Brooke, M.A. (Rector of Thornhill), Mr. William Cash, F.G.S. (Halifax), Rev. Robert Fisher, M.A. (Vicar of Sewerby), Mr. F. R. Fitzgerald (Harrogate), Mr. Riley Fortune (Harrogate), Mr. John Gerrard (Wakefield), Mr. Thomas Grant (Pocklington), Mr. Percy H. Grimshaw (Burley-in-Wharfedale), Mr. T. S. Hall (Wetherby), Mr. C. D. Hardcastle (Leeds), Mr. T. H. Nelson, M.B.O.U. (Redcar), Mr. R. Reynolds, F.C.S. (Leeds), Rev. C. Fullerton (Vicar of Lund), and Mr. Samuel Walker (York)—then took place. It is the privilege of the General Committee to add to its own number ten permanent members, and this privilege was utilised, Messrs. S. H. Bennett (Rotherham), John Braim (Pickering), E. P. P. Butterfield (Wilsden), John Grassham (Leeds), Percy Lund (Bradford), H. M. Platnauer, B.Sc., A.R.S.M. (York), John Stears (Hull), M. H. Stiles (Doncaster), Edward Tindall (Knapton Hall), and William Whitwell (London), all of them gentlemen to whom the Union has been indebted from time to time—being chosen.

The Annual Report was then read, as follows:—

25th ANNUAL REPORT.—The Yorkshire Naturalists' Union has now existed for a quarter of a century, and it is matter for congratulation that the success which has marked its operations during the past decade still continues unabated, and that the Union—the oldest of its kind in the kingdom—is at the present time in a flourishing and vigorous condition. Much of this success is attributable to the fact that its executive and its officers have never failed to bear in mind that the

primary object of the Union is systematic and persistent investigation directed towards a sound and accurate knowledge of the natural history and the physical features of the county. To the results of these investigations are the transactions exclusively devoted, and to the furtherance of this end the excursions are planned.

The Meetings held during the year have been four in number; the places visited being:—Askern, Thursday, 20th May; Flamborough, Whit-Monday, 14th June; Pateley Bridge, Saturday, 17th July; and Pickering, Bank Holiday Monday, 2nd August. [We omit the detailed description of the excursions, which have all been reported in our pages.] On each of these occasions the Union was placed under great obligation to the landed gentry of the county for the kind and generous manner in which its investigations were facilitated and encouraged, and in this connection it is a source of gratification to record that during the whole series of about sixty excursions which have been made during the past decade, there has been but one solitary instance of a refusal to grant the permission applied for.

A fifth meeting had been planned for the end of September, to take the form of a Fungus Foray, but an unfortunate clashing of dates with those arranged by the Scottish Cryptogamic Society, and other unforeseen circumstances, rendered it desirable to postpone it for another year, when your Executive have every confidence in its proving a more than ordinarily successful gathering.

The Societies which constitute the Union now number 32, being a decrease of two from last year. Two societies—the Rastrick and Brighouse Naturalists' Society and the Scholes Botanical Society—have severed their connection with the Union by resignation, and two others—the Scarborough Scientific Society and the Selby Naturalists' Society—are reported as having practically ceased to exist. On the other hand, two strong societies—the Cleveland Naturalists' Club with 61, and the Harrogate Naturalists' Society with 54 members—have been admitted, and it may be observed that applications have been received from two other societies for admission for the coming year.

The statistics which the secretaries of the various local societies have been good enough to furnish in accordance with precedent show that the number of associates is now 1,915, which, added to the members, makes a total for the Union of 2,290 members and associates.

The Membership of the Union, as distinguished from that of the local societies it includes, stands at about the same figure as last year, 375. With the view of facilitating an increase, a nomination-form has been printed on the blank page of the circular of the present annual meeting, and it is hoped that this will be extensively used. The number of members is not as large as it ought to be for so important a county or as the utility of the researches undertaken by the Union demands, and the Executive would be glad to have assistance from all who feel interested in promoting the work for which the Union exists, in raising the number of members to a considerably higher figure than that at which it now stands.

Finance.—The financial statement will show that the position of the Union is in a sound and healthy condition.

The Local Treasurers have proved themselves to be, as in former years, a much valued help to the Central Executive, in giving members a convenient method of discharging their obligations to the Union, and the best thanks of the Union are due to these gentlemen.

The Publications of the Union have been as heretofore.

The Transactions.—Part 9, referred to in the last report, has been issued to the members, and Part 10 is in the printer's hands. It will contain some instalments of the lists of Yorkshire Birds, Coleoptera, and Mollusca, of more than usual interest and value.

Lees' West Riding Flora.—In accordance with agreement, the manuscript and copyright of the West Riding Flora were placed in the hands of the Union by its author last April. The manuscript was immediately put in the printer's hands. The work of correcting the proofs has been actively proceeded with during the year, and is now drawing near a conclusion. Circulars asking for subscriptions to the book will shortly be issued, and it is expected that the Flora itself—which will extend to more that 600 pages, and which includes lists,

not only of the flowering plants, but of all the cryptogams, and chapters on lithology and climatology, with a map, will be published during the course of the spring or early summer.

Sections.—The work of the various sections has been carried on during the year with the same amount of energy and success as heretofore, and the Union is indebted to its sectional officers for much of the success of the various meetings.

A new section has been added to the list, for the investigation of forms of life, both animal and vegetable, which need the use of the microscope as an adjunct to their study. Relief will thus be afforded to the Botanical section (by whom much good work has always been done in this direction) and to the various zoological sections under whose cognizance these lower forms formerly came.

Committees of Research.—During the past few months steps have been taken for stimulating systematic research into specific subjects, with the result that proposals will be brought before the General Committee this day for the appointment of a Yorkshire Boulder Committee and a Yorkshire Marine Zoology Committee. The former is intended to co-operate with and assist the committee appointed by the British Association for the purpose of recording the distribution and occurrence of boulders and erratic blocks; while the latter will have for its object the organisation of means for ascertaining the forms of animal life which inhabit the Yorkshire coast and neighbouring seas, a vast field of inquiry in which so far there is but little on record. Both subjects are such as cannot be dealt with at the excursions, and which need special attention.

British Association.—At the meeting of the British Association the Union was officially represented, the delegate being this year the Rev. E. Ponsonby Knubley.

The Library of the Union has been very largely increased by donations, some of them of very considerable importance. Particular mention should be made of a valuable donation from Mr. Basil T. Woodd, of Conyngham Hall near Knaresborough, of a set of 27 volumes of the 'Zoologist,' and to him the thanks of the Union have been presented.

The growing extent of the Union's Library has engaged the attention of your Executive, who have had pleasure in appointing Mr. Charles Brownridge to act as Librarian, and it will be proposed that the General Committee henceforth add to the list of general officers an honorary librarian, with a seat on the executive.

The books and other property of the Union are deposited in a room at the Leeds Mechanics' Institute, by the kindness of the Committee of the Institute, to whom the Union are also under great obligation for allowing Executive meetings to be held in their Board-room free of charge.

The Executive will be pleased to receive donations of suitable books, especially such as bear upon the objects and investigations which the Union exists to facilitate; and particularly of copies of works and papers published or written by its members.

The Secretariate.—Your Executive have had under consideration the considerable amount of labour which has of late fallen upon your Honorary Secretaries in respect of the management of the Union's business and the editorial supervision of its publications, and have decided to recommend to the General Committee the appointment of two Assistant Secretaries, for which posts two occupants have been found in the persons of Messrs. Percy H. Grimshaw and W. Cecil Scott, both of Leeds.

The Presidency.—Your Executive have offered the Presidency for the coming year to Sir Ralph Payne-Gallwey, Bart., of Thirkleby Park, near Thirsk, a resident in the county and well known through his publications as a keen and highly-accomplished field-naturalist. The post has been accepted by him, and the Union is thus again fortunate in securing for its President a gentleman in whose hands the dignity of the office will be as worthily maintained as it has been by his distinguished predecessors.

The audited Balance Sheet was then presented, and showed the Union to be in a very satisfactory condition. After discussion the report and balance sheet were adopted, on the motion of Dr. H. C. Sorby, F.R.S., seconded by Mr. John Emmet, F.L.S.

The Excursion programme for 1887 was then resolved upon, as follows :—

Saltburn ; Whit-Monday, 30th May.
Thirkleby Park, for Gormire Lake (by invitation of the new President) ; July (date to be afterwards arranged).
Sedbergh ; Bank Holiday Monday, 1st August.
Welton Vale ; Saturday, 27th August.
Fungus Foray ; at Leeds, in September.

Proceeding to the election of officers for 1887, it was first resolved to create the office of Hon. Librarian, with an ex-officio seat on the Executive. It was then announced that Sir R. Payne-Gallwey, Bart., M.B.O.U., etc., had accepted the offer of the presidency which had been made to him. The two retiring Hon. Secretaries (Messrs. W. Denison Roebuck, F.L.S., and W. Eagle Clarke, F.L.S., both of Leeds), were re-elected ; and Messrs. Percy H. Grimshaw (Burley-in-Wharfedale) and W. Cecil Scott (Leeds) were chosen as Hon. Assistant Secretaries ; and Mr. Charles Brownridge, Assoc.M.Inst.C.E., F.G.S., as Hon. Librarian. The Rev. W. Fowler, M.A. (Liversedge), and Messrs. J. W. Davis, F.S.A. (Halifax), G. C. Dennis (York), John Emmet, F.L.S. (Boston Spa), C. P. Hobkirk, F.L.S. (Dewsbury), B. Holgate, F.G.S. (Leeds), H. T. Soppitt (Bradford), and J. J. Stead (Heckmondwike), retiring members of the Executive, were re-elected, and Messrs. S. A. Adamson, F.G.S. (Leeds), and W. Cash, F.G.S. (Halifax), were chosen for the two remaining seats on the Executive. Messrs. J. E. Bedford and C. D. Hardcastle were chosen Auditors.

It was then resolved to appoint a Yorkshire Boulder Committee, to co-operate with and assist the Boulder Committee of the British Association, with Prof. A. H. Green, M.A., F.R.S. (Leeds), as Chairman, and Mr. S. A. Adamson, F.G.S. (Leeds), as Secretary.

It was also resolved to appoint a Committee to promote investigations into the Marine Zoology of the Yorkshire coast, with Dr. H. C. Sorby, F.R.S. (Sheffield), as Chairman, and Mr. W. Eagle Clarke, F.L.S. (Leeds), as Secretary.

A resolution was then proposed by Mr. J. W. Addyman, B.A. (Leeds), requesting the Executive to consider the constitution of the General Committee, with a view of securing the due representation of all classes of members of the Union thereon. This was accepted on behalf of the Executive and voted.

The General Committee then adjourned. The sections thereupon met and elected their officers as follows :—

Vertebrate Zoology.—Rev. E. Ponsonby Knubley, M.A., M.B.O.U., Staveley Rectory, president ; Mr. James Backhouse, junr., M.B.O.U., York, secretary (re-elected).

Conchology.—Rev. W. C. Hey, M.A., York, president ; Messrs. J. D. Butterell, Beverley, and John Emmet, F.L.S., Boston Spa, secretaries (all re-elected).

Entomology.—Mr. F. N. Dobrée, Beverley, president (re-elected); Messrs. G. C. Dennis (re-elected) and S. Walker, both of York, secretaries.

Botany.—Mr. F. Arnold Lees, Heckmondwike, president; Mr. P. F. Lee, Dewsbury, and M. B. Slater, Malton, secretaries (both re-elected).

Geology.—Rev. E. Maule Cole, M.A., Wetwang, president; Messrs. S. A. Adamson, F.G.S., Leeds, and S. Chadwick, Malton, secretaries (all re-elected).

Micro-Zoology and Botany.—Dr. H. C. Sorby, F.R.S., Sheffield, president; Mr. J. M. Kirk, Doncaster, secretary (both re-elected).

Afterwards tea was served in the Wesleyan School-room in Wellington Road, and at 7 p.m. the Annual Public Meeting of the Members and Associates was held in the Industrial Hall, when there was a very large attendance. The chair was taken by the president, Dr. Dallinger, who, after the annual report had been read and the excursion programme announced for the benefit of the members generally, delivered the annual address. He took for his subject, 'My latest Lenses, and their most recent Work,' and the lecture was illustrated by a large number of lantern-slides. During the delivery of the address the chair was occupied by Mr. C. P. Hobkirk, F.L.S., president of the Dewsbury Naturalists' Society. A vote to the president was adopted on the motion of Dr. Sorby, seconded by the Mayor of Dewsbury (Mr. Ald. T. B. Fox); and afterwards a similar compliment to Mr. Hobkirk and the Dewsbury Society, on the proposition of Dr. Dallinger and the Rev. W. Fowler.

In connection with the visit of the Union to Dewsbury, the local society had organized an excellent conversazione, which engaged the attention of the members and friends for the remainder of the evening. This included a grand display of more than fifty microscopes, numerous stereoscopes, collections of agates, plants, shells, minerals, coins, birds' eggs, photographs, etc. Among the more special exhibits, Dr. Sorby showed a series of his own drawings of river and coast scenery in East Anglia, and Mr. G. T. Porritt, F.L.S., on behalf of the Rev. John Hellins, a fine series of some of the most exquisite drawings of lepidopterous larvæ by the late William Buckler, which are to be published by the Ray Society.

LIST OF MEMBERS, MAY 1887.

The names in black type are those of members of the General Committee.

Adamson, S. A., *F.G.S., Leeds.*
Addison, Rev. Frederick, *M.A., Thirsk.*
Addyman, J. W., *B.A., Leeds.*
Airy, Rev. Basil R., *Whitwell, York.*
Aldam, William, *J.P., D.L., Frickley.*
Allen, A. H., *F.I.C., F.C.S., Sheffield.*
Anne, Captain E., *J.P., Burghwallis.*
Atkinson, Rev. J. C., *B.A., Danby.*
Atkinson, William, *Leeds.*
Backhouse, Jas., *F.L.S., F.G.S., York.*
Backhouse, Jas., jun., *M.B.O.U., York.*
Bairstow, S. D., *F.L.S., Cape Colony.*
Baker, John G., *F.R.S., F.L.S., Kew.*
Barnes-Lawrence. Rev. H. F., *Birkin.*
Barran, John, *M.P., Leeds.*
Barry, Rev. E. I., *M.A., Beverley.*
Barwick, John Marshall, *M.A., Headon.*
Beaumont, Alfred, *Lewisham, S.E.*
Bedford, Charles, *Leeds.*
Bedford, James, *Leeds.*
Bedford, J. E., *Leeds.*
Bennett, Samuel H., *Rotherham.*
Bethell, William, *J.P., D.L., Rise.*
Bewlay, Frederick, *York.*
Bidwell, E., *M.B.O.U., Twickenham.*
Bingley, Godfrey, *Headingley, Leeds.*
Birchall, Edward, *Leeds.*
Birks, Edward, *Sheffield.*
Birks, Thomas, jun., *Liverpool.*
Blakey, J. Kenworthy, *F.G.S., Leeds.*
Blakeley, John Wesley, *Liversedge.*
Boyd, Ven. Archdeacon, *D.D., Arncliffe.*
Booth, James, *F.G.S., Ovenden.*
Booth, Walter William, *Leeds.*
Bothamley, C. H., *F.C.S., Leeds.*
Bould, C. H., *Huddersfield.*
Bower, T. E., *Fewston, near Otley.*
Boyes, Frederick, *Beverley.*
Boynton, Thomas, *Bridlington.*
Brady, William E., *Barnsley.*
Braim, John, *Pickering.*
Braithwaite, Wm. D., *Ackworth.*
Branson, F. W., *F.C.S., Leeds.*
Brigg. John, *J.P., F.G.S., Kildwick.*
Brittain, Frederick, *Sheffield.*
Broadhead, John, *Barnsley.*
Broadhead, Seth, *Barnsley.*
Broadhead, W. H., *Leeds.*
Bromley, John H., *Leeds.*
Brook, Geo., ter., *F.L.S., Huddersfield.*
Brook, William, *Goole.*
Brooke, Edward, *F.G.S., Huddersfield.*
Brooke, John Arthur, *J.P., Fenay Hall.*
Brooke, Rev. Canon J. I., *Thornhill.*
Brooke, T., *J.P., F.S.A., Huddersfield.*
Broughton, C. J. E., *Wortley, Sheffield.*
Brownridge, Charles, *F.G.S., Leeds.*
Brunton, George, *Leeds.*
Buckley, Thos. E., *F.Z.S., Glenrossal.*
Bunker, Thomas, *Goole.*
Burrell, J. C., *Sheffield.*
Butterfield, J. A., *Blackheath, S.E.*
Butterfield, E. P. P., *Wilsden.*
Butterell, J. Darker, *Beverley.*
Carter, James, *Masham.*
Carter, J. W., *Bradford.*
Carter, Thomas, *Masham.*
Carter, W. Rawson, *Sheffield.*
Cash, William, *F.G.S., Halifax.*
Chadwick, S., *Norton, near Malton.*
Chaloner, Rev. J. W., *Newton Kyme.*
Chaytor, R. C., *Scrafton Lodge.*
Cheesman, William Norwood, *Selby.*
Clark, J. E., *B.A., B.Sc., F.G.S., York.*
Clark, Robert, *Pickering.*
Clarke, W. E., *F.L.S., M.B.O.U., Leeds.*
Clarkson, W. C., *L.R.C.P., Pateley.*
Clayton, John, *Bradford.*
Colby, George, *Malton.*
Cole, Rev. E. Maule, *M.A., Wetwang.*
Colley, Francis H., *Sheffield.*
Collier, Thomas, *Ripon.*
Conacher, John, jun., *Huddersfield.*
Coning, —, *Malton.*
Copley, Walter, *Sowerby Bridge.*
Cordeaux, John, *M.B.O.U., Ulceby.*
Coupland, Joseph, *High Harrogate.*
Cover, John Lee, *South Milford.*
Craig-Christie, A., *F.L.S., Edinburgh.*
Creyke, Ralph, *J.P., Rawcliffe Hall.*
Crosland, Charles, *Halifax.*
Crossley, William H., *Maltby.*
Crossley, Miss Frances Ann. *Maltby.*
Crossley, Miss Mary A. B., *Maltby.*
Dale, R. Thornton, *Ilkley.*
Dale, Miss Emily, *Ilkley.*
Dale, Miss Flora, *Ilkley.*
Dallinger, Rev. W. H., *LL.D., Sheffield.*
Darbishire, R. D., *B.A., Manchester.*
Davis, J. W., *F.S.A., F.L.S., Halifax.*
Davis, Harry, *Halifax.*
Davison, George, *Beverley.*
Dawson, Percival William, *Hull.*
Denham, Thomas E., *Huddersfield.*
Dennis, George C., *York.*
Denny, Alfred, *Sheffield.*
Devonshire, His Grace the Duke of, *K.G.*
Dickinson, Frederick Wm., *Rotherham.*
Dobree, N. F., *Beverley.*
Dunning, J. W., *M.A., F.L.S., London.*
Eddy, J. R., *F.R.M.S., F.G.S., Skipton.*
Ellis, H. M., *Beverley.*
Embleton, Thomas W., *Methley.*
Emerson, E. B., *J.P., B.A., Redcar.*
Emmet, John, *F.L.S., Boston Spa.*
Empson, Christopher, *Sowerby Bridge.*
Eskholme, George, *J.P., Rotherham.*
Faulding, Joseph, *Hastings.*

Featherstone, J. Garbutt, *York.*
Fisher, Rev. Robert, *M.A., Sewerby.*
Fitzgerald, Francis R., *Harrogate.*
Foggitt, William, *Thirsk.*
Fortune, Riley, *Harrogate.*
Foster, Matthew, *Brough.*
Foster, Charles, *Headingley.*
Fowler, Rev. Wm., *M.A., Liversedge.*
Fox, Rev. H. E., *M.A., Durham.*
Gallwey, Sir Ralph P., Bart., *Thirkleby.*
Gardiner, H. T., *Goole.*
Gardner, J., *Hartlepool..*
Gaunt, Leonard, *Farsley, Leeds.*
Gaunt, Mrs. Leonard, *Farsley, Leeds.*
Gerrard, John, *Wakefield.*
Gill, Hugh, *Boston Spa.*
Gough, Thomas, *B.Sc., F.G.S., York.*
Grant, Thomas, *Pocklington.*
Grassham, John, *Leeds.*
Gray, Thomas H., *Calverley, nr. Leeds.*
Green, Prof. A. H., *M.A., Headingley.*
Greenwood, T. W., *Batley.*
Gregson, William, *Baldersby.*
Grimshaw, P. H., *Burley-in-Wharfedale.*
Grove, Edmund, *F.R.M.S., Kew.*
Gurney, J. H., jun., *F.Z.S., Norwich.*
Hailstone, Edwd., *F.S.A., Walton.*
Hall, Thomas Sutcliffe, *Wetherby.*
Hardcastle, C. D., *Leeds.*
Harding, Rev. I., *Bradford.*
Harker, A., *M.A., F.G.S., Cambridge.*
Harrison, John, *Wilstrop Hall.*
Harrison, John, *Goole.*
Harvie-Brown, John A., *Dunipace, N.B.*
Herries, Rt. Hon. Lord.
Hewetson, H. B., *M.R.C.S., Leeds.*
Hewett, William, *York.*
Hey, Rev. Wm. C., *M.A., York.*
Hick, Thos., *B.A., B.Sc., Manchester.*
Hill, Ald. John, *Morley.*
Hindley, A. D., *Liversedge.*
Hirst, Joseph, *Huddersfield.*
Hobkirk, C. P., *F.L.S., Dewsbury.*
Hodgson, William, *Malham.*
Holgate, B., *F.G.S., Leeds.*
Hopkinson, John, *F.L.S., St. Albans.*
Horne, Ralph D., *Leyburn.*
Horne, William, *Leyburn.*
Horsfall, John, *F.R.C.S., Leeds.*
Huddart, Rev. G. A. W., *M.A., Ripon.*
Hudleston, W. H., *M.A., Weybridge.*
Hudson, Baker, *M.C.S., Redcar.*
Hummel, J. J., *F.C.S., Leeds.*
Hunter, Edward, *F.C.S., Whitby.*
Hurst, Josh. S., *Copt Hewick.*
I'Anson, J.C., *F.G.S., F.S.A., Saltburn.*
Illingworth, Benjamin, *Bradford.*
Ingleby, James, *Eavestone, Ripon.*
Ingram, Hobson, *Horsforth.*
Irvin, Rev. B., *M.A., Saltburn.*
Irvine, Charles Stuart, *Adel, Leeds.*
Jackson, John, *M.P.S., Wetherby.*
Jackson, George, *York.*
Jefferson, R. P., *M.R.C.S., Leeds.*
Jessop, Rev. Wm., *F.A.S., Rawdon.*
Johnson, Henry, *Barnsley.*
Jowitt, Mrs. Hannah, *Ripley, Leeds.*
Kendall, Richard William, *Selby.*
Kerr, Henry, *Stacksteads, Manchester.*
Kirk, J. M., *Doncaster.*
Knubley, Rev. E. P., *M.A., Staveley.*
Ladmore, E. J., *Bradford.*
Lancaster, William J., *Barnsley.*
Law, A. E., *Sheffield.*
Lawton, Philip W., *Easington, Hull.*
Leadman, Alex. D. H., *Boroughbridge.*
Leatham, E. A., *M.A., Cirencester.*
Lee, Phineas F., *Dewsbury.*
Lees, F. A., *M.R.C.S., Heckmondwike.*
Lightfoot, Rev. Geo. H., *Pickering.*
Lister, Thomas, *Barnsley.*
Lister, Thomas, *Malton.*
Lund, Charles, *Ilkley.*
Lund, Percy, *Ilkley.*
Lupton, Henry, *F.E.S., Leeds.*
Malt, James, *New Wortley, Leeds.*
Manning, J. B., *Wakefield.*
Marsh, Robert, jun., *Rotherham.*
Marshall, John, *F.G.S., Todmorden.*
Mason, P. B., *F.L.S., Burton-on-Trent.*
Massee, G. E., *F.R.M.S., Kew.*
Maxwell-Stuart, Hon. H. C., *Tadcaster.*
McGhie, William K., *Rastrick.*
McIntyre, Joseph Wrightson, *Sheffield.*
McLandsborough, J., *F.G.S., Bradford.*
McLean, Donald, *Golspie, N.B.*
Meade, R. H., *Bradford.*
Metcalfe, John Henry, *Leyburn.*
Metcalfe, George, *Pateley Bridge.*
Miall, Prof. Louis C., *F.L.S., Leeds.*
Milner, Miss, *Bishopthorpe, York.*
Mitchell, T. Carter, *Topcliffe.*
Moiser, H. R., *F.G.S., York.*
Morrison, Walter, *M.P., Malham.*
Naughton, John, *Harrogate.*
Nelson, William, *M.C.S., Leeds.*
Nelson, Thos. H., *M.B.O.U., Redcar.*
Newbitt, Thomas, *Whitby.*
Nuttall, William, *Eccleshill, Bradford.*
Oldfield, G. W., *M.A., Kensington, W.*
Oldroyd, Edward, *Horbury.*
Ormerod, Thomas, *Brighouse.*
Oliver, Jesse, *Leeds.*
Olsen, O. T., *F.L.S., Grimsby.*
Paley, Dr., *Ripon.*
Pallister, John William, *B.A., Leeds.*
Pape, Tom, *Helmsley, York.*
Parkin, George, *Wakefield.*
Parsons, H. F., *M.D., London, S.E.*
Patchett, Isaac, *F.C.S., Leeds.*
Paterson, A., *Doncaster.*
Payne, Henry, *M.D., Wath.*
Paver-Crow, R., *J.P., Ornhams Hall.*
Peach, Robert, *Harrogate.*
Pearson, Hugh W., *Malton.*
Pease, H. J. Robinson, *J.P., Beverley.*

Pease, W., *Howden.*
Penistone, Miss F. A., *Leeds.*
Platnauer, H. M., *A.R.S.M., York.*
Pocklington, Henry, *F.R.M.S., Leeds.*
Pocklington, C., *F.R.M.S., Manningham*
Pollard, Harry, *New Wortley, Leeds.*
Porritt, G. T., *F.L.S., Huddersfield.*
Powell, Francis Sharp, *J.P., Bradford.*
Powys, Rev. Annesley, *Meanwood.*
Pratt, Thomas, *M.R.C.V.S.E., Ripon*
Priestman, Frederick, *J.P., Bradford.*
Prodham, Herbert, *Allerston.*
Proudlock, John, *Market Weighton.*
Pulleine, Rev. Canon J. J., *Kirby Wiske.*
Pyman, W. H. S., *Whitby.*
Radcliffe, Sir P., Bart., *Rudding Park.*
Raven, Rev. T. Milville, *M.A., Bedale.*
Rawson, F. G. S., *Thorpe, Halifax.*
Reynolds, Richard, *F.C.S., Leeds.*
Rhodes, James, *Rotherham.*
Richardson, Hugh, *Newcastle-on-Tyne.*
Rickards, Geo. H. L., *Pool, Leeds.*
Ridgway, J. A., *F.R.A.S., Beverley.*
Ripon, Most Hon. Marquis of, *K.G.*
Roberts, George, *M.C.S., Lofthouse.*
Robinson, William, *Sedbergh.*
Roebuck, W. Denison, *F.L.S., Leeds.*
Rollit, A. K., *LL.D., D.C.L., Hull.*
Rookledge, J., *F.R.M.S., Easingwold.*
Roper, Wm. Greaves, *Sheffield.*
Ross, L. B., *F.C.S., F.R.H.S., Driffield.*
Rothery, James, *Liversedge.*
Roundell, Charles S., *M.P., London.*
Rowley, Walter, *M.E., F.G.S., Leeds.*
Rowntree, Frank, *York.*
Rowntree, James H., *Scarborough.*
Russell, A., *Malton.*
Russell, W. B., *LL.B., New Leeds.*
Salter, John H., *Kidderminster.*
Saville, Jonas, *Bradford.*
Sawdon, Frederick John, *M.D., Hull.*
Saynor, Benjamin, *Leeds.*
Scargill, A., *Sheffield.*
Scott, Walter Cecil, *Headingley, Leeds.*
Shepherd, C. W., *Ilkley.*
Shuffrey, Rev. W. A., *M.A., Arncliffe.*
Siddell, George, *Sheffield.*
Sims, Henry, *Ripon.*
Slater, Rev. H. H., *Irchester, Northants.*
Slater, Matthew B., *Malton.*
Smart, Rev. E. H., *Kirby-in-Cleveland.*
Smith, Rev. Henry, *Redcar.*
Smith, Rev. C. Fullerton, *Lund, Preston.*
Smith, Mark, *York.*
Somerset, Herbert, *Doncaster.*
Soppitt, Henry Thomas, *Bradford.*
Sorby, H. C., *LL.D., F.R.S., Sheffield.*
Speight, Harry, *Bradford.*
Spencer, James, *Halifax.*
Spiking, J. F. T., *Birstal.*
Spurling, John, *Wakefield.*
Standen, Robert, *Manchester.*
Stead, John James, *Heckmondwike.*
Stears, John, *Hull.*
Steel, R. Elliott, *M.A., Bradford.*
Stiles, M. H., *Doncaster.*
Stoks, Edwin, *Rawdon, near Leeds.*
Stott, Walter Henry, *Doncaster.*
Stuart, J. A. E., *L.R.C.S.Ed., Staincliffe.*
Stubbins, J., *F.G.S., F.R.M.S., Leeds.*
Summerfield, Rev. R. A., *N. Stainley.*
Swailes, Johnson C., *Beverley.*
Sykes, J., *M.D., J.P., F.S.A., Doncaster.*
Taylor, W. W., *Newnham, Cambridge.*
Taylor, John W., *Horsforth, near Leeds.*
Taylor, Rev. R. V., *B.A., Melbecks.*
Taylor, Vincent, *B.A., Ilkley, Leeds.*
Teasdale, W., *F.R.M.S., Leeds.*
Terry, James, *Bradford.*
Tetley, C. F., *Leeds.*
Tew, T. W., *J.P., Pontefract.*
Thirkettle, George, *Headingley.*
Thompson, E. V., *Scarborough.*
Thompson, Richard, *York.*
Thompson, Major B. Blaydes, *Harrogate.*
Thompson, Rev. W., *M.A., Sedbergh.*
Thrippleton, John, *Leeds.*
Tiddeman, R. H., *M.A., F.G.S., London.*
Tindall, George, *Newmarket.*
Tindall, Edward, *Knapton Hall.*
Travis, Rev. William Travis, *Ripley.*
Trickett, John, *Dacre Banks. Leeds.*
Waite, William, *Clayton West.*
Wake, C. Staniland, *M.A.I., Welton.*
Walker, Samuel, *York.*
Walker, Isaac, *Rotherham.*
Waller, Alfred Rainey. *York.*
Walsingham, Rt. Hon. Lord, *M.A.*
Walton, F. F., *L.R.C.P., Hull.*
Ward, Henry Snowdon, *Bradford.*
Ward, Seth, *Dewsbury.*
Ward, George, *F.I.C., F.C.S., Leeds.*
Watson, Arnold Thomas, *Sheffield.*
Watson, John, *Kendal.*
Watson, J. W., *Coatham.*
Watts, Rev. A., *F.G.S., Durham.*
West, William. *F.L.S., Bradford.*
Wharncliffe, Rt. Hon. Earl of.
Whincup, Richard, *Pateley Bridge.*
Whitaker, T. S., *F.R.G.S., Brough.*
Whitaker, J., *F.Z.S., Rainworth.*
Whitfield, J., *F.C.S., Scarborough.*
Whitwell, William, *London.*
Williamson, Prof. W. C., *Manchester.*
Willis, John, *Ph.D., Manningham.*
Wilson, John, *J.P., Seacroft Hall.*
Wilson, John H., *Harrogate.*
Wilson, J. E., *Bradford.*
Winter, George, *Doncaster.*
Wood, J., *B.A., F.R.A.S., Boston Spa.*
Woodd, Basil T., *J.P., Knaresborough.*
Woodd, C. H. L., *J.P., Oughtershaw.*
Wrigglesworth, E. B., *Wakefield.*
Wright, John, *Terrington, near York.*
Yewdall, Edwin, *Leeds.*

Naturalist,

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NORTH YORKSHIRE:

STUDIES OF ITS BOTANY, GEOLOGY, CLIMATE, AND PHYSICAL GEOGRAPHY.

BY

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(The next instalment will include the Chapters on Lithology and Climatology, illustrated with a Coloured Map).

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NORTH YORKSHIRE:

STUDIES OF ITS BOTANY, GEOLOGY, CLIMATE, AND PHYSICAL GEOGRAPHY.

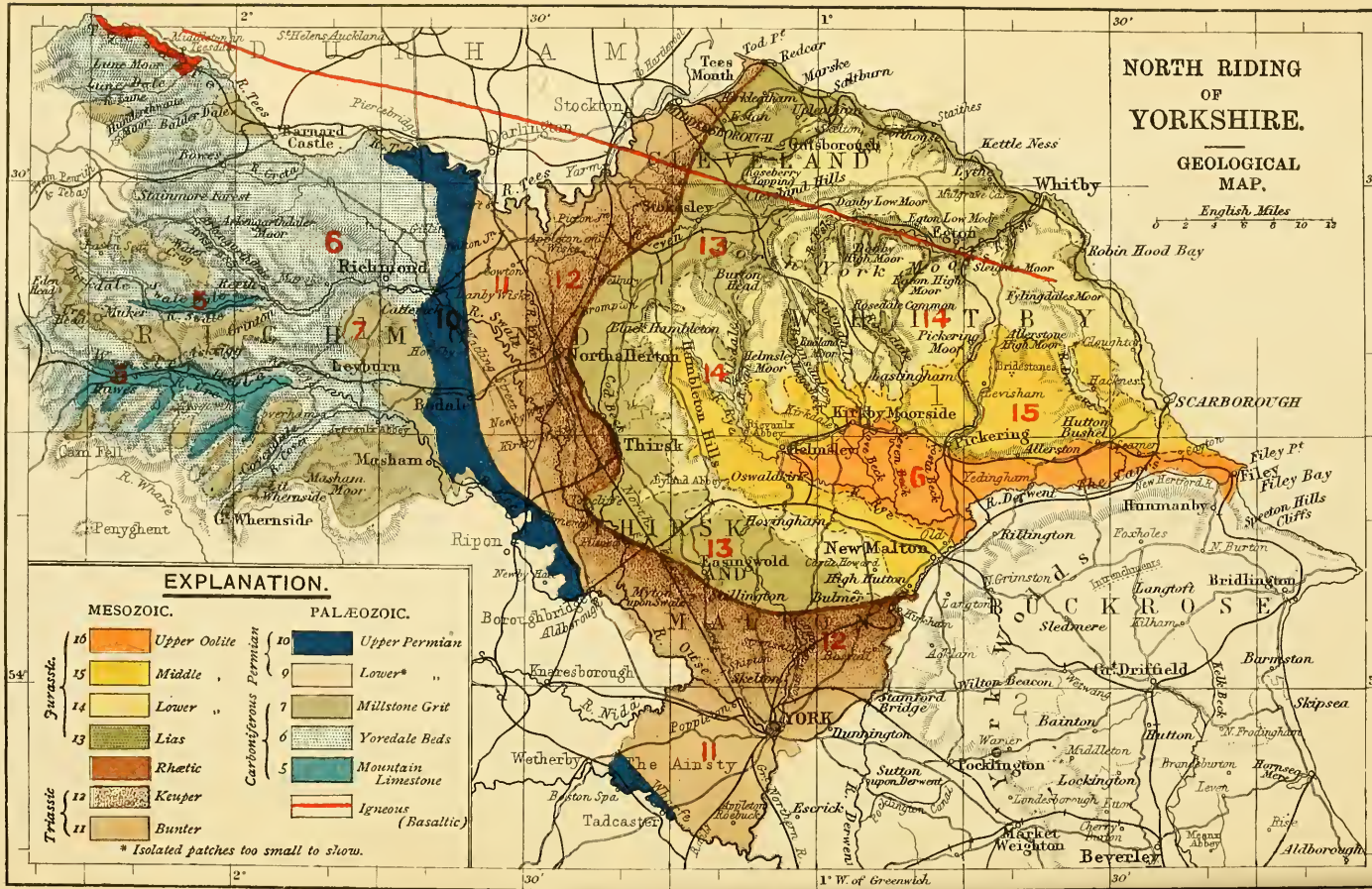
INTRODUCTION.

North Yorkshire, as the term is here employed, comprises the North Riding of Yorkshire, properly so called, and also the Ainsty and City of York. For legal purposes the City of York is a County by itself, and the Ainsty is now a wapentake of the West Riding; but North Yorkshire, as here understood, is the parliamentary district which is designated by that name. It is bounded on the north by Durham, on the west by Westmorland, on the south by the West and East Ridings of Yorkshire, and on the east by the German Ocean. It includes a surface of irregularly rhomboidal contour, 2,112 square miles (1,361,664 acres) in area, which measures at the utmost 88 miles from east to west, and 53 from north to south. Only three of the English counties are larger than it is; and these are Devonshire, Lincolnshire, and Norfolk. Physically, it may be roughly described as a broad central valley running north and south between two ranges of hills. The western mass attains an elevation of about 2,600 feet above the sea-level, and the range which is situated on the east of the central valley reaches nearly 1,500 feet, the general slope of the surface being from north-west to south-east. The Riding embraces within its limits a very wide diversity of natural features; a coast line where long ranges of cliff succeed undulated banks of shifting sand and low flat tracts of marsh; a rich and well-cultivated interior mapped out into fields of corn and grass, separated from one another by thick shadowy hedgerows, and diversified by woods and rivers; and above the valley on either side rise extensive tracts of moorland country, bleak and heathery throughout its higher levels, intersected by pleasant dales and clear sparkling streams, its summits girdled with long lines of rugged and precipitous scar. Its productive industry is mainly agricultural, that which does not ally itself to some branch of farming being principally employed in the iron trade and with shipping, and there are no manufactures or coal mines of any considerable extent within its limits. York, with its castle and cathedral and old historic memories, is its only city, and has

now (1887) within its parliamentary limits a population of over 76,000. Then come the Tees-side towns:—Middlesbrough, a port for the Durham coal-field, and the nucleus of the Cleveland iron district, which has risen during the present century from a solitary farm-house to a town of nearly 70,000 inhabitants at the present time (1887); and South Stockton, with 10,600 inhabitants. Next in order are the fashionable sea-side resorts: Scarborough, with 36,000, and Whitby, with 18,600 inhabitants; and Redcar (with Coatham), Saltburn-by-the-Sea and Marske, each about 5,000 or so. Next follow four agricultural centres, not long ago parliamentary boroughs, Malton, Richmond, Thirsk, and Northallerton, with populations ranging from 5,300 to 3,700. Besides these there are fourteen agricultural market towns, with populations ranging from upwards of 6,600 to about 600, which in order of population are as follows, viz.:—Guisborough, Pickering, Easingwold, Hawes, Kirby-moorside, Stokesley, Helmsley, Yarm, Masham, Bedale, Reeth, Leyburn, Middleham, and Askrigg. The average population of the whole of North Yorkshire in 1881 was 164 to a square mile; and in the North Riding, exclusive of the Ainsty, the area occupied by corn-crops was 206,651 acres, green-crops 75,605 acres, clover and grasses 62,631 acres, permanent pasture 469,799 acres, flax 11 acres, bare fallow 35,874 acres, orchards 979 acres, market gardens 283 acres, nursery grounds 184 acres, and woodland 49,106 acres.

Into the past history of the inhabitants of the district, of their rulers and other notabilities, of their wars and progress in the various arts of civilization, its castles, abbeys, camps and other antiquarian remains, it is proposed not to enter at all, but to confine attention to the physical features which the field of study itself presents; in the first place to consider the circumstances and details of the internal structure, physical geography and climate of its various districts; and afterwards to enumerate the plants of the higher orders which it produces and treat respecting their distribution over the various parts of its surface, at the same time endeavouring to trace out in what way the facts connected with the distribution of the plants connect themselves with, and serve to indicate conditions of climate and geological constitution.

GEOLOGY.


NORTH RIDING
OF
YORKSHIRE.
GEOLOGICAL
MAP.
English Miles
0 2 4 6 8 10 15
EXPLANATION.
MESOZOIC.
PALÆOZOIC.
Jurassic.
16 Upper Oolite
15 Middle ,,
14 Lower ,,
13 Lias
Rhætic
Triassic
12 Keuper
11 Bunter
Carboniferous Permian
10 Upper Permian
9 Lower* ,,
7 Millstone Grit
6 Yoredale Beds
5 Mountain Limestone
Igneous (Basaltic)
* Isolated patches too small to show.
Richmond
Northallerton
Thirsk
Helmsley
Kirkby Moorside
Pickering
SCARBOROUGH
Whitby
Robin Hood Bay
Filey
Filey Bay
Hunmanby
Bridlington
Driffield
New Malton
Ripon
Boroughbridge
Knaresborough
YORK
Wetherby
The Aimsty
Tadcaster
Escrick
Market Weighton
Beverley
Aldborough
Leyburn
Reeth
Marsham
Penyghent
Whernside
Barnard Castle
Darlington
Stockton
Tees Mouth
Guisborough
Staithes
Kettle Ness
Egton
Goathland
Fylingdales Moor
Pickering Moor
Hasingham
Levisham
Hutton Bushel
Flixton
Speeton Hills
Cliffs
Foxholes
Burton
Grimston
Langtoft
Sledmere
Wilton Beacon
Fridaythorpe
Burnston
Skipsea
Bainton
Hutton
Nafferton
Lockington
Leven
Driffield
Wilton
Stamford Bridge
Dunnington
Sutton upon Derwent
Escrick
Londesborough
Market Weighton
Beverley
Aldborough
Boroughbridge
Knaresborough
Ripon
Newby Hall
Myton upon Swale
Allerton
Oswaldkirk
Hovingham
Yedingham
Kirkham
Skelton
Poppleton
Aldborough
Boston Spa
Thorpe Arch
Roecliffe
Sinnington
Kirkham
Helmsley
Rievaulx Abbey
Byland Abbey
Coxwold
Newburgh Priory
Mount Grace Priory
Egglestone Abbey
Richmond
Catterick
Scorton
Gilling
Hipswell
Brompton
Bolton
Middleham
Leyburn
Reeth
Marsham
Penyghent
Whernside
Barnard Castle
Darlington
Stockton
Tees Mouth
Guisborough
Staithes
Kettle Ness
Egton
Goathland
Fylingdales Moor
Pickering Moor
Hasingham
Levisham
Hutton Bushel
Flixton
Speeton Hills
Cliffs
Foxholes
Burton
Grimston
Langtoft
Sledmere
Wilton Beacon
Fridaythorpe
Burnston
Skipsea
Bainton
Hutton
Nafferton
Lockington
Leven
Driffield
Wilton
Stamford Bridge
Dunnington
Sutton upon Derwent
Escrick
Londesborough
Market Weighton
Beverley
Aldborough
Boroughbridge
Knaresborough
Ripon
Newby Hall
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Skelton
Poppleton
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Scorton
Gilling
Hipswell
Brompton
Bolton
Middleham
Leyburn
Reeth
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Penyghent
Whernside
Barnard Castle
Darlington
Stockton
Tees Mouth
Guisborough
Staithes
Kettle Ness
Egton
Goathland
Fylingdales Moor
Pickering Moor
Hasingham
Levisham
Hutton Bushel
Flixton
Speeton Hills
Cliffs
Foxholes
Burton
Grimston
Langtoft
Sledmere
Wilton Beacon
Fridaythorpe
Burnston
Skipsea
Bainton
Hutton
Nafferton
Lockington
Leven
Driffield
Wilton
Stamford Bridge
Dunnington
Sutton upon Derwent
Escrick
Londesborough
Market Weighton
Beverley
Aldborough
1° W. of Greenwich
54°
30'

Plate 1.

GEOLOGY.

Corrected and Revised by J. Edmund Clark, B.A., B.Sc, assisted by H. M. Platnauer, B.Sc., A.R.S.M.

[For fuller information on this subject, see Phillips' 'Illustrations of the Geology of Yorkshire' (an elaborate work in two quarto volumes, with numerous coloured sections and figures of fossils), and the same author's 'Rivers, Mountains, and Sea-coast of Yorkshire.' Sedgwick's Monograph on the Magnesian Limestone, in the Transactions of the Geological Society, new series, vol. 3, p. 37-118; and Williamson on the fossils of the Yorkshire coast, Geol. Trans., n. s. vol. 5. Besides these works, available at the time of the first edition, the following may be mentioned among many which deal more or less directly with the district in question :—Phillips' Geology of the Yorkshire Coast, 1875, edited by R. Etheridge; The Yorkshire Lias, by R. Tate and J. F. Blake (Van Voorst); Papers on the Yorkshire Oolites, by W. H. Hudleston (Proc. Geol. Assn., Aug. 1874, Jan. 1875, and Oct. 1878); Ordnance Survey Maps and Memoirs, especially upon 'The geology of the country between Whitby and Scarborough,' by C. Fox Strangways and G. Barrow. For general relationships to other parts, Woodward's 'Geology of England and Wales' is very valuable, and Harrison's chapter on the North Riding, in his 'Geology of the Counties of England and Wales,' is a useful summary. Lebour's 'Geology of Northumberland and Durham' also treats of the Cleveland district.]

With the exception of a small tract of Basalt in Upper Teesdale, and a narrow dike or terrace of the same nature which enters Yorkshire east of Middleton in the same valley of Tees to penetrate the Cleveland moors, all the subjacent rocks of North Yorkshire are of the kind which owe their origin to the gradual deposit of sediment from water. Except in the shape of loose fragments in the glacial drift, we have not either Slate, Granite, or Chalk: and although Kainozoic deposits are met with just beyond our boundary, except the glacial drift all the sedimentary deposits which occur within the limits of our field of study belong either to the Palæozoic or Mesozoic periods. In order of deposition they range either from west to east or from north-west to south-east, so that a person travelling in a direct line from the Derwent valley, opposite Filey, to the summit of Cronkley fell in Teesdale, would pass over each of the series of strata in succession, and each change would be from rocks of a more recent to those of an earlier date of deposition; or if he were travelling in an opposite direction each change would be from rocks of an earlier to those of a later date. The following table will shew their order and geological classification :—

TABLE OF THE STRATA OF NORTH YORKSHIRE.

The numbers and arrangement [as well as the colouring of the map] are adapted from Ramsay's Geological Map of England and Wales, slightly modified by the Ordnance Survey Maps, upon which Ramsay's is based. The *numbers* in Ramsay's map run up from 1 (Cambrian) to 26 (Alluvium). 8 is the Coal Measures and the Cretaceous are 18 to 21.

NAMES.	LOCALITIES.
III. Quaternary part of Kainozoic Age.	
PLEISTOCENE SYSTEM.	
Glacial Epoch	Superficial deposits filling the great central valley and its main branches to a considerable depth, and to be met with even on the highest ground.
II. Mesozoic or Secondary Age.	
JURASSIC SYSTEM.	
16. *Upper Oolite*	Helmsley, Pickering, Kirby-moorside.
15. *Middle Oolite*	Summits of the tabular range of hills between Thirsk and Scarborough.
14. *Lower Oolite*	Summits of the Cleveland hills and flanks of those between Thirsk and Scarborough.
13. *Lias*	Whitby, Redcar, Guisborough, Stokesley, Easingwold.
TRIASSIC SYSTEM.	
Rhætic Passage Beds	Lazenby (S. W. of Redcar), Stokesley, Barton Hill (York and Malton Line).
12. *Keuper Marls* ..... 11. *Bunter Sandstone*	Yarm, Northallerton, Croft, Thirsk, York.
I. Palæozoic or Primary Age.	
PERMIAN SYSTEM (DYAS).	
10. *Upper (Magnesian Limestone, &c.)*	Piercebridge, Tanfield, Ripon, Thorparch, Tadcaster.
9. *Lower*	Near Thorparch.
CARBONIFEROUS SYSTEM.	
7. *Millstone Grit*	Cotherstone, Masham, Colsterdale, Deepdale, and summits of most of the western hills.
6. *Yoredale Rocks* ..... 5. *Mountain Limestone*	Most of Western Moorlands; lower beds in Wensleydale, Swaledale, Gretadale, Upper Teesdale.
SILURIAN SYSTEM	Upper Teesdale.

I. Palæozoic Age.

THE SILURIAN SYSTEM

Is represented in North Yorkshire only by an isolated patch in the upper Tees Valley, between Falcon Clints and Cronkley Fell. It is probably Lower Silurian (Stockdale Shales), consisting of soft shales, formerly worked into slate pencils. The exposure is much obscured by glacial deposits. See Q. J. G. S., xxxiv. (1878), p. 27; Yorks. G. & P. Soc. Journal, 1877, p. 239; also paper by Mr. Gunn at the Plymouth Meeting of the British Association, 1875.

THE CARBONIFEROUS SYSTEM.

A line drawn from Pierce Bridge on the Tees, to Tanfield on the Yore, bounds on the east that part of North Yorkshire which is underlaid by the Primary rocks. The Carboniferous system taken as a whole makes up the entirety of the western mass of moorlands. Its oldest or Limestone series of strata may be conveniently treated under two divisions, a lower and an upper set of beds, and it is in the midst of the former that the Teesdale basalt is intruded and has its place.

(5) *The Mountain Limestone (or Scar Limestone) Series.*— This lower limestone is more or less exposed to view in the depths of each of the three principal dales of the western moorlands, Teesdale, Swaledale, and Yoredale. A long line of strongly marked dislocation passes northward from the Ingleborough district to the mountains round the source of the South Tyne, an idea of the tremendous character of which may be gathered from the fact that for a length of forty-five miles the strata are displaced to the extent of at least three thousand feet. An observer stationed upon the elevated edge on the east of this line (as for instance, upon the summit of Wild Boar Fell or Swarth Fell, which are situated in Westmorland, just opposite the head of Yoredale) stands upon millstone grit strata, with a thick mass of mountain limestone beneath them, and sees outstretched 2,000 feet below him the valley of the Eden and the plain of Carlisle, where these same mountain limestone and

millstone grit beds are buried beneath superincumbent deposits of New Red Sandstone. From this main line of dislocation, which is known by the name of the Pennine fault, two cross lines strike out at right angles towards the east. The northern one of these is about fifty miles in length, and is continued from Brampton in Cumberland to the Northumbrian coast near Cullercoats, relatively depressing the strata on the north and elevating those on the south of it to an extent which cannot be estimated at less than two thousand feet. The southern line, or rather a double southern line, known as the great Craven Fault, reaches about thirty miles, and may be distinctly traced as far eastward as Wharfedale, in the same way relatively depressing the strata on the south and elevating those on the north of it from one to three thousand feet.

It is along the line of the Pennine Fault and in the Craven country about Settle that this lower mountain limestone is seen to the best advantage. Here it forms a compact calcareous mass about 400 feet in thickness, with very little or hardly any interpolation of non-calcareous material, with numerous vertical fissures, and in some places, as for instance on the south-eastern slope of Ingleborough, it may be seen with its lower beds full of broken slate boulders resting upon masses of dark-coloured Silurian slate. The steep precipices which girdle Langstrothdale, Littondale, Gordale, Ribblesdale, Ingletondale, and Kingsdale, and the thick mass of caverned and fissured limestone that forms the general base of the well-known Craven hills, Fountains Fell, Ingleborough, Penyghent, and Whernside, must all be referred here. Along the western border of the county it forms the lower part of the great Pennine escarpment, still shewing fine limestone scars as far north as the country round the head of the Tees. But as it passes towards the north, both along the edge of this line and in the interior of the moorland mass, it loses the distinctly marked calcareous stamp which characterises it in Craven, and the farther it goes in that direction, argillaceous and arenaceous bands are more and more

mixed up with the limestone. In Penyghent and Ingleborough its upper surface is 1,300 feet, and beneath Great Whernside it is 1,400 feet above the sea-level. At the head of the Ribble it has sunk to 1,000 feet, and between this point and the south side of Yoredale opposite Hawes it declines 150 feet more. Altogether in Yoredale about 240 feet of its upper portion is exposed. It fills up the lower part of the valley from the Hawes neighbourhood as far east as Redmire, a distance of twelve miles. Its limestones form the long low terrace that borders the road between Askrigg and Carperby, the falls about the village of Gayle, the picturesque rapids of Aysgarth, and they may also be seen exposed round the sides of Seamer Water. Here the interpolations in the limestone are principally argillaceous, and may be best seen about Askrigg and above Aysgarth Bridge, and bear altogether to the limestone a proportion of about two to three. From Great Whernside to Aysgarth it declines 700 feet in eight miles. On the north side of Yoredale opposite Hawes we have the upper surface of this lower limestone at about 800 feet above the sea level, and in Swaledale, at about the same height, a small portion of the upper part is exposed to view in the neighbourhood of Muker. From this point northward it is not anywhere to be seen till we reach Upper Teesdale. In the Mickle Fell tract the upper beds may be seen immediately above the Basalt. Here the upper band of limestone is from 25 to 50 feet in thickness, and is known by the name of Tyne bottom limestone. In Cronkley Fell it reaches an elevation of 1,750 feet, but from this point it is much depressed by dislocations both towards the north and east, and south-east of the great fault which ranges along Lunedale it is lost altogether. By proximity with or contiguity to the Basalt, the various strata become much changed in character, the shales prismatised, both the sandstones and shales bleached and rendered brittle, and the normally compact calcareous beds which immediately overlie the basalt are metamorphosed, as in Cronkley Fell, into a loosely granular

'sugar limestone.' A few miles further north the rich mining tract of Alston Moor furnishes the following section of the beds of this series :—

	feet.
Tyne bottom limestone	24
Alternations of shales and sandstone	74
(Here the Basalt occurs)	
Jew lime	24
Alternations	26
Little Lime	18
Alternations	90
Smiddy Lime	31
Sandstone	12
Limestone	25
Alternations	21
Robinson's lime	21
Alternations	12
Great limestone of Melmerby Scar	132
Alternations and coal	24
Limestone	12
Alternations	165
Limestone	7
Alternations and coal	221
Limestones	18
Alternations	234

Total thickness of the series, 1,191 feet.

312 feet calcareous, 879 feet non-calcareous.

The Teesdale Basalt or Whin Sill.—A huge mass of rock which has owed its origin to igneous agency, and which is known locally by the name of the Whin Sill*, extends from the neighbourhood of Brough in Westmorland into the district round the head waters of the Tees, Wear, and Tyne, and from thence, with some interruptions, is continued as far north as the Northumbrian coast, near Alnwick. It attains its greatest development at the Caldron Snout, where it is from 200 to 300 feet in thickness, being in Tynedale about 120 feet thick, and at the head of Hilton Beck, which is only six miles westward from the Caldron Snout, becoming diminished to 24 feet. Generally the deposit is remarkably layer-like in character, conformed to the plane of the stratification of the neighbouring

* Whinstone is the local name for basaltic rock, the Scottish quhynstane. Sill is the Saxon syll, syle, the French seuil, the flat piece of timber or stone at the foot of a door or the bottom of a window.

sedimentary rocks, and in Teesdale and Tynedale it would seem to be nearly or quite uniform in its geological position, which is always below, but not far below, the Tyne bottom limestone which forms the uppermost band of the series of beds which has just been noticed. Generally it is fine in grain and dark in colour, and forms rudely prismatic vertical columns. At the Caldron Snout, where the foaming waters of the Tees leap down a basaltic ravine two hundred feet in depth, this columnar structure may be seen to the best advantage, and it may be observed upon a smaller scale in the falls of Blea Beck. Spreading from the Caldron as a centre, in our district the Basalt ranges up Maize Beck for two miles, attains a considerable elevation above the river in Cronkley Scars, and may still be seen in the river-bed as far down as the High Force and Winch Bridge. At the High Force the top of the waterfall is Basalt, and the lower beds indurated and subprismatic shale, with beds of limestone below. Leaving the Tees lower down it ranges along the south side of the dale past Holwick and Unthank, and at last is lost about a quarter of a mile from the Tees half a mile from its junction with the Lune. The whole district is full of the marks of eruptive force and the influence of great dislocations. Its four principal faults will be noticed more particularly when we come to speak of the Yoredale Rocks. From the upper part of Lunedale two basaltic dikes pass near the end of the great basaltic mass, and are prolonged in a north-eastern direction to the Durham coal-field. Although there is in our district great uniformity in its geological position, the fact that the beds above the great Whin Sill are altered as well as those upon which it rests, shows that it is an intrusive sheet.

(6) *The Yoredale Rocks.*—The most characteristic section of the upper mountain limestone series of strata is to be met with in the upper part of Yoredale or (as it is now more commonly called) Wensleydale, in the neighbourhood of Hawes. In the fells upon both sides of the dale it reaches a thickness

of nearly one thousand feet, and is made up of not less than five distinct bands of limestone, with intermediate beds of non-calcareous constitution, as follows, viz. :—

	Feet.
The main or twelve fathom limestone	70
Laminated grit and plate, with ironstone and coal	80
The underset limestone	30
Gritstone, flagstone and plate, with coal and impure limestone.....	350
The middle limestone	30
Gritstone, flagstone and plate.....	150
The Simonside limestone	20
Flagstone, gritstone and plate	100
The Hardraw limestone	40
Gritstone and plate	100

Total thickness of the series, 970 feet.
190 feet calcareous, 780 non-calcareous.

Of these bands of limestone the Main, or upper, is the most conspicuous, the Middle and Simonside bands least so. Everywhere in the neighbourhood of Hawes the Main Limestone may be seen at a height above the sea of about 1,800 feet. As we proceed from Hawes southward in the direction of Craven, we have, as before stated, the plane of the stratification of the lower mountain limestone series sloping upwards and at the head of the Ribble 150 feet higher than at Hawes. In this direction the space between the Main and Underset bands of limestone grows thinner, till at last they are united together into one mass on the south side of Cam Fell. As the series is shown on the north side of the great Craven Fault, a still further contraction of the non-calcareous interpolations as compared with the Hawes section is seen. In Penyghent the upper surface of these Yoredale Rocks is 1,900 feet above the sea-level and its beds as under, viz. :—

	Feet.
The upper or Cam limestone	60
Gritstone, flagstone and plate.....	225
The middle limestone	20
Plate, etc.	92
The Simonside limestone.....	20
Gritstone and plate	62
The Hardraw limestone, with thin plates...	40
	519 feet.

In Ingleborough the section is similar to this last, but the upper limestone is about 200 feet higher than in Penyghent, and considerably thinner. It forms a scar about 30 feet in thickness, which may be seen to advantage on the crest of the Ingleton or western slope of the mountain.

From Hawes, proceeding towards the east down the Yoredale valley, we have on the south side of it the Underset limestone at an elevation of 1,565 feet forming the summit of Addlebrough, and along the line of drainage which forms the southern boundary of the Riding, the Main limestone maintaining an elevation of about 1,900 feet from Widdale Fell along Cam Fell as far east as the head of Bishopdale. But between this point and the Wharfedale slope of Great Whernside, where the lower limestone is 1,400 feet high, the Yoredale series has declined in level upwards of 200 feet by the upper limestones having become completely obliterated, and the non-calcareous interpolations between the lower beds having also vanished almost entirely, as the following section shows:—

	Feet.
Plate	84
Limestone with partings of plate	111
Plate	4
Dark limestone	78
	277 feet.

This is the section of the Yoredale Rocks on the Wharfedale side of Great Whernside, but on the Coverdale side of the mountain and at the summit of drainage between Coverdale and Wharfedale the upper limestones may be seen making their appearance and rapidly attaining a considerable thickness, so that on the west side of Coverdale the Main limestone is from 30 to 40 feet thick, and these, with the non-calcareous bands which are interpolated between the lower beds, in the space between the Wharfedale side of Great Whernside, and Starbotton, a distance of only three miles, swell the series from 227 to 510 feet. Along the whole length of Coverdale, a distance of 15 miles, the non-calcareous beds above the middle

limestone, which in the Hawes district attain a thickness of 430 feet, are only augmented to 150 feet, whilst towards the east they are diminished to 30 feet, and towards the south and south-east vanish altogether; and in like manner the non-calcareous beds below the middle limestone, which at Hawes are 350 feet in thickness, in Coverdale are reduced to 150 feet, and towards the lower part of Wharfedale, in a south-eastern direction, cease altogether; a state of things plainly pointing to the conclusion that in this district at this particular epoch the deep sea was towards the south-east and its shores towards the west and south-west.

At the west end of Penhill we have the Yoredale Rocks from 600 to 700 feet in thickness, with all the principal beds of the Hawes section present, but the grits and plates above the Middle limestone much reduced in thickness. On the Coverdale side of Penhill the Main limestone has sunk to 1,100 feet above the sea-level, and the Hardraw limestone ranges from the end of Bishopdale past West Witton and dips beneath the surface in the bed of the Yore near Bolton Hall. By the time we reach Middleham Moor the Main limestone has declined to 850 feet, and at East Witton to 400 feet above the sea-level. Here it is extensively quarried, and is about 20 feet thick. It may be traced along the whole length of both sides of Coverdale, in the lower part of the dale forming a terrace, on the surface of which the high road is carried in some places; and as we proceed from these points further east, the series is altogether buried beneath the Millstone Grit.

On the north side of the Yoredale valley, the Hardraw limestone may be best seen at the waterfalls called Hardraw Force and Mill Gill Force, the Upper limestone best at Leyburn Shawl, and between Askrigg and Carperby, and most of the lower members of the series may be examined at the lead mines at Ellerbank near Carperby and at the Keld heads near Preston-under-Scar. At the former locality the Main limestone forms a double scar at an elevation of about 1,200 feet and

the Underset limestone from 1,125 feet is thrown down by a dislocation to 1,000 feet. At Preston the succession of the beds below the Middle limestone, as given to me by Mr. Craig, of Aysgarth, is as follows, viz. :—

30 eet—Middle limestone, rich in ore
Gritstone
Coal seam 1 foot thick
Plate
Grit
Flagstone worked above Carperby
Large Plate
Thin Lime
Strong gritstone
Small plate
Post, of grit
Plate
20 feet—Simonside limestone
Grit
Plate
Grit
Plate
Thin lime
Ironstone, thin
Plate
Grit
Small plate
Plate and Ironstone
Grit
Small Plate
60 feet—Hardraw limestone
Grit
Plate

From an elevation of 1,700 feet in Cotter Fell and the south side of Lovely Seat, the Main limestone declines gradually eastward to 1,025 feet at Preston, 836 feet at Leyburn Shawl, and 700 feet at the town of Leyburn. Through the mass of moor between Yoredale and Swaledale, the course of the series is nearly level or declining slightly towards the north. On the south side of Lovely Seat the Main limestone is upwards of 200 feet lower than in Cam Fell and Bear's Head, and on the north or Swaledale side of the same hill it is 1,554 feet in elevation, with 660 feet of the Millstone Grit beds over it. Between this point and Muker the Yoredale Rocks are exposed in Cliff Gill, with a total thickness of nearly 700 feet, with all the limestones of the Hawes section present, the upper band 82 feet, and the underset band with chert on the top of it, 54 feet in thickness, but the lower limestones thinner than at Hawes; and the non-calcareous interpolations above the Middle limestone 237 feet thick, instead of 430, and those below it 210 feet instead of 350. The head of the pass between the dales of the Swale and the Eden is 1,700 feet in elevation, and the mountain peaks that encircle it are about 600 feet higher, and here also the Main limestone is between 1,500 and 1,600 feet in elevation.

East of Lovely Seat it attains 1,600 feet in Satron Hangers, and from thence sinks eastward to 800 feet in Downholme Moor.

A few miles from the head of Swaledale the valley divides into two, and the two branches rejoin each other at Muker. A fine ridge of hill which bears the name of Kisdon is thus insulated, and here the Yoredale Rocks may be well seen, the Main limestone forming the summit of the mass at its southern extremity, but having a cap of Millstone Grit over it at the north end of the ridge, which reaches an elevation of 1,643 feet. The tract between the Swale and the Greta is a rich and long worked lead-mining country, with many dislocations. In Nine Standards the Main limestone attains about 1,700 feet. Ascending Water Crag by way of Stonesdale, we have the Underset limestone at an elevation of 300 feet above Muker and 1,150 feet above the sea-level; above it about 60 feet of non-calcareous interpolation, 80 feet of Main limestone, and between this and the hill summit in this direction nearly 900 feet of the beds of the Millstone Grit series; but on the eastern or Arkengarthdale* side of the same hill the Main limestone is nearly 100 feet higher, its upper surface in Punchard's Gill being 1,360 feet in elevation, with the base of the Underset limestone 190 feet below it, and 230 feet more of the lower beds before we reach the bed of the stream. Towards the south-east the Main limestone reaches 1,600 feet in the angle between Arkengarthdale and Swaledale above Reeth. Along the line of the former dale, which runs from the north-west towards the south-east, a fault depresses the beds in a north-eastern direction, and in Fremington edge we have the Main limestone at 1,150 feet, and the Middle limestone at 200 feet above the river. From this point through the moorlands eastward to the Castle Hill at Richmond, a distance of eight miles, the Main limestone sinks gradually to 450 feet.

* Misprinted Argengarthdale in Ramsay's map; where also read Ampleforth for Appleforth (S.W. of Helmsley) and Flaxton for Flexton (N.E. of York); also Heworth, a suburb of York, is misplaced four miles to the east. Arkengarthdale is sometimes abbreviated into Arkendale.

In the dale of the Greta we have only the upper half of the series visible. The Middle Limestone may be seen in the deeply excavated river bed near Rutherford Bridge, and the Flagstones above it are quarried extensively about Brignall and Scargill. The junction of the Tees and Greta is in the Main Limestone at an elevation of 380 feet, and the same rock, with its beds dipping steeply towards the north, forms the bed of the Tees * beneath the well-known Abbey Bridge of Egglestone, and the equally well-known scars that margin the Greta in Rokeby Park. From this point the Main Limestone may be traced along the edge of the fells which border the dale of the Greta to an elevation of nearly 1,000 feet at Bowes, and from thence along the south side of the dale by way of Gilmonscar, past the summit of drainage between Arkengarthdale and Swaledale to Gilling, and from thence back again to Rokeby, beneath Gatherley Moor by way of Forcett and Hutton Magna: and a small isolated tract of limestone is also to be seen on the east of the gritstone at Middleton Tyas.

Between Gretadale and Lunedale there is a synclinal fold or trough in the Mountain Limestone, dipping from the south and north towards Deepdale and Balderdale, so deeply that in this tract of country the Yoredale Rocks are altogether buried beneath superincumbent masses of Millstone Grit. Along the line of Lunedale a fault runs which elevates the strata on the north of it to the extent of about 1,000 feet. Another fault passes from the Caldron Snout along the line of Maize Beck between Mickle Fell and Birkdale, elevating the strata on the south-east, and a third along the line of the main dale of the Tees, throwing up the beds towards the south, which in the

* 'That mighty trench of living stone,
. . . . .
Where Tees, full many a fathom low,
Wears with his rage no common foe,
Nor pebbly bank, nor sandbed here,
Nor clay-mound checks his fierce career,
Condemn'd to mine a channel'd way
O'er solid sheets of marble grey.'
SCOTT'S *Rokeby*.

neighbourhood of Middleton causes a difference of some hundreds of feet between the elevation of the beds on the opposite sides of the dale. So that the triangular tract of country enclosed between the Tees, the Lune, and Maize Beck consists of a pyramid of beds of the Yoredale Rocks elevated upon a floor of Basalt and Mountain Limestone lifted considerably higher than the corresponding strata in the country which immediately surrounds it. The Main Limestone forms the general plateau of the culminating Mickle Fell ridge, and there is a cap of sixty feet of gritstone over it at the western or highest end of the ridge, which is the highest point in Yorkshire, and which reaches an elevation of nearly 2,600 feet. The height reached by the Yoredale Rocks in the Teesdale district is its maximum elevation in Britain. Here the Main Limestone is 70 feet thick and the Underset Limestone 24 feet thick, with a space of about 80 feet between them. Complicated dislocations, especially the three faults to which reference has just been made, and a fourth which is called the Burtree Ford dike, and which ranges from Langdon Beck across the east end of Falcon Clints and Cronkley Scars towards the head of Lunedale, causing a down-throw on the east to the extent of about 200 feet, produce great confusion in the stratification of the lower beds of the series. These vary considerably in thickness in different places, the greatest thickness anywhere attained by a lower limestone being 40 feet and the space between the Underset Limestone and the Tyne Bottom Limestone ranging from about 300 to 600 feet. Between the Main Limestone of Mickle Fell and the Tyne Bottom Limestone of the White Force, there is a difference in level of 850 feet, but here the Burtree Ford dike intervenes. In Alston Moor the Yoredale Rocks are 495 feet thick, 350 feet of which is made up by non-calcareous beds, the principal of which are two bands of hard grit-stone called respectively the Brigstone Hazle and the Nattriss Gill Hazle.

(7) *The Millstone Grit Series.*—For a typical section of this series as we have it in North Yorkshire we must go either

to Colsterdale on the east of Great Whernside, or to where the beds of this series fill up the great synclinal depression between Swaledale and Lunedale, the existence of which has been indicated when speaking of the subjacent strata; or, better still, to the hills which surround the lower part of Wharfedale and Nidderdale, where we shall find it thicker and better developed than it is anywhere within our own proper limits. The various members of the series are very different in different localities, so that it is often a task of great difficulty to decide respecting the identity of the beds, and their proper relation to one another. In the Ilkley and Pateley Bridge tract the series attains in some places a thickness of fully one thousand feet, with strata as under, viz. :—

		Feet.	Feet.
6.	Upper grit of the Wharfedale summits	100 to	360
5.	Upper plate and flagstone group with chert and coal, about	200 or	250
4.	Coarse middle or Sandhill grit	30 to	50
3.	Lower plate group, with gritstone, thin limestone, and coal	300 ,,	350
2.	Lower or Ingleborough grit, with plate and coal	100 ,,	300
1.	Chert, limestone and plate beds	12	

The following is the detailed Witton Fell and Colsterdale section as observed in the Brown Beck collieries, the gritstone of the surface apparently corresponding to the Middle Grit of Nidderdale and Wharfedale, and the lower beds representing the Lower Plate group.

	Feet.	Inches.
Strong gritstone of Agra Crags	51	6
Ochry soft sandstone	1	9
Platy grit	4	6
Bluish laminated grit and plate	63	
Grey sandstone and blue soft stone	4	11
Platy grits and alternations	33	
Solid grit rock	7	
Platy grit	6	
Solid grey sandstone	5	
Dark plate	34	
Hard grey laminated stone	21	
Coal		3
Hard grey stone with round balls	18	9
Crinoidal limestone	15	
Hard yellowish cherty stone	6	
Blue plate	5	
Coal	1	4
Total thickness of the Lower Plate group above main coal seam.	225 feet.	

In Great Whernside the series is about 600 feet thick, the beds of the summit representing the Upper Plate and Flagstone group of Nidderdale and the Lower Grit ranges down both sides of Coverdale, with the Middle Grit over it in isolated patches to form the highest summits. From the edge of Coverdale proceeding eastwards towards the central valley the mass of moorland slopes with considerable abruptness, and within a short distance of Masham some of the beds higher than the Middle Grit make their appearance, and nearer Tanfield a grit-stone is to be seen which most likely represents the Upper or Brimham Gritstone. In Penhill the series is exhibited as follows, the grit of the summit still apparently representing the Middle Grit of Nidderdale, but with the Lower Nidderdale Grit shewn only in a very imperfect manner.

	feet.
Grit rocks of the summit	150
Alternations of plate and flaggy grits with coal in the upper part	250
Plates, flagstones, etc.	60
Little limestone, chert and plates	80
Total	540 feet

In Buckden Pike, where the surface of the Main Limestone is 1850 feet above the sea-level, the Millstone Grit series is only 450 feet in thickness, the summit rock being rather higher in the scale than that of Penhill. But as we proceed westward amongst the remainder of the hills on the south side of Yoredale we get only a small thickness of the beds of this series, and that is only shewn in the shape of ridges or isolated patches upon a great limestone floor; as may best be seen in two of the hills in the immediate neighbourhood of Hawes, Dodd Fell and Bear's Head.

Between Yoredale and Swaledale the series is thickest towards the western and eastern extremities of the moorland mass, the Main Limestone being left at or near the surface in the central portion of the range. In the five high summits on the edge of Mallerstang there are from 700 to 800 feet of Millstone Grit beds above the Main Limestone; on the south side of

Lovely Seat 535 feet and on the north side 662 feet; and at Leyburn a coal seam upwards of a foot thick is obtained on the moor top about 120 feet above the Main Limestone, which has a thick gritstone over it on the east, and in the neighbourhood of Downholme and Hudswell the same coal seam is also worked.

Next we pass to the tract of the great synclinal depression, and by combining two of the Arkengarthdale mining sections, and taking for each bed its greatest thickness in either of the two we obtain the following result, viz. :—

		feet.
No. 4.	Main chert	18
	Alternations of plate, limestone & chert	80
No. 3.	White gritstone	66
No. 2.	Grit and plate with coal	25
	Crow limestone	18
	Flinty chert with alternations of plate	51
	Alternations of plate and limestone	37
	Plate	30
No. 1.	Millstone grit	120
	Total	445 feet.

Here the top Millstone Grit would appear to represent the Middle Grit of Nidderdale and the Summit Grit of Penhill and the Colsterdale watershed, and the White Grit the Lower Gritstone of Nidderdale and Ingleborough, the rest of the beds being grouped and numbered in correspondence with the Nidderdale section on page 19.

On the Stonesdale side of Water Crag the series is upwards of 900 feet thick, and here we have above the Main Limestone 122 feet of the Lower Cherty group, 80 feet of the White Grit, 110 of the Upper Cherty group, and 600 feet more of Plates, Middle Grits and the Upper Plates and Grits of Nidderdale before we reach the summit. In Nine Standards the Main Limestone is considerably higher than in Water Crag, and the Gritstone thinner. At this point it is about 400 feet in thickness, and from thence along the summit of the escarpment over Mallerstang as far north as Stainmoor, the upper beds are still those which overlie the upper Arkengarthdale Grit. At the western

edge of the county the road at the bottom of the Stainmoor depression is 1,450 feet above the sea-level, in beds not far above the Main Limestone. On the north side of the Stainmoor hollow the summits of the west and the peak of Goldsborough attain the Middle Gritstone; and the general floor of the lower moorlands in the Lartington and Cotherstone tract is made up of the argillaceous beds below it. And north of the Lunedale fault the series is only seen in two caps over the Main Limestone of the Mickle Fell ridge, one at its eastern, and the other, which is 60 feet in thickness and forms the highest part of the hill, at its western extremity.

THE PERMIAN SYSTEM.

(9) *The Lower and* (10) *The Upper* (*Magnesian Limestone*) *Series.*—Within the limits of our field of study, along the whole length of the line of the edge of the Millstone Grit beds, none of the strata of the Coal Measures are to be seen, although they make their appearance both in a northern and southern direction soon after North Yorkshire is left behind, and both South Durham and West Yorkshire yield rich and extensively worked coal fields. It would from various considerations seem probable that these two coal fields, though now separated by a distance of 60 miles, have been originally connected together and that they have formed parts of one and the same mass. Both of them are formed in a basin of Millstone Grit and both are covered unconformably by the beds of the Magnesian Limestone. Coals of like quality are worked in both of them in the same parts of the series and in both of them courses of Ironstone are plentiful in the lower and central portions of the formation. The long and varied range of deposits which we have already passed under review has evidently been laid down very gradually, and their deposition must have extended over a very lengthened period of time. But the era which immediately followed the end of that during which the beds of the great Carboniferous system were laid down has on the

contrary been marked by a general eruption of disturbing forces, of the energy of which we may form some kind of an idea by studying the traces which they have left behind them in the tract of country with which we are here more particularly concerned. At Cullercoats the Tynedale fault dislocates a mass of Magnesian Limestone strata, but although such is the case we may confidently infer from the fact of the nonconformity of the plane of the stratification of the great mass of the Magnesian Limestone deposits in Durham and throughout Yorkshire to that of the subjacent Millstone Grit and Coal Measures, that it is to the earlier part of the Permian epoch that we must look as the period of the Craven and great Pennine dislocations, especially as the condition of the beds in the valley of the Eden altogether confirms this view of the case. So that we have the upheaval of the whole mass of our western moorlands in the manner which has already been described and the entire sweeping away of whatever portion of the beds of the Coal Measure series may have been deposited on the east of them to appeal to as a criterion of the extraordinary power and activity of the forces which came into operation at the era at which we have now arrived.

It is this upheaval and denudation rather than the deposition of strata which constitute the groundwork from which we have to evolve the history of the Permian epoch so far as North Yorkshire is concerned. From the Midland Counties northward an escarpment of Permian beds margins the Carboniferous deposits along the line of their eastern boundary. Through West Yorkshire this escarpment is continuous and each of the rivers, in its course from west to east, breaks through it. In the south of the county it is usually several miles in breadth and in one place it attains 450 feet in elevation above the sea-level. At the south-west corner of the Ainsty the Magnesian Limestone margins the Wharfe with cliffs at Thorparch and Newton Kyme. Passing northward by way of Knaresborough and Ripon it crosses the Yore half a mile below Tanfield Bridge.

North of the Yore the escarpment is much narrower than in the neighbourhood of Doncaster and Tadcaster. It soon rises to an elevation of 300 feet, with a conspicuous slope in an eastern direction. It ranges nearly in a straight line past Well and Nosterfield to a hill about two-thirds of a mile west of Thornton Watlass and there the escarpment suddenly terminates. From Watlass to Little Crakehall there is no trace of Magnesian Limestone; it is either entirely swept away or else buried beneath the thick beds of glacial gravel which overspread this tract. It is laid bare again in the bed of the rivulet at Little Crakehall, and again makes its appearance beneath a mound of glacial gravel five miles further north by the side of the private road from Bedale to Catterick, about half a mile from the latter locality; and is probably continued beneath the ridge which extends in the direction of Tunstall. It occurs also under thirty feet of glacial gravel on the right bank of the Swale about half a mile below Catterick Bridge. In the flat country north of the Swale and along the edge of the hills of Yoredale beds at Middleton Tyas there are no traces of it, but it reappears in a hill about half way between Newton Morrell and Cleasby, and is again seen at Rennison quarry, near Eppleby; and by the Tees' side west of Piercebridge it forms a cliff beneath thirty feet of glacial deposit. North of the Tees it forms a cliff at Coniscliffe, and from this point northward through the county of Durham the escarpment becomes much increased in width. In the south of Durham it fills up the whole of the space from Hartlepool westward to the North Eastern line of railway. It borders the Durham coal-field on the south-east and becomes gradually narrower as we proceed northward. About Sunderland and Marsden there are excellent sections in the coast cliffs and it finally ceases upon the coast a short distance to the north of the Tyne.

Taking the series as a whole as represented in the North of England, its divisions were given by Professor Sedgwick as follows, viz. :—

6. Red and white marls.
5. Thin bedded compact limestone, scarcely magnesian.
4. Red and white marls and gypsum.
3. Magnesian limestone in thick beds, in colour generally whitish or yellowish.
2. Marl slate in thin layers.
1. Yellow or purple sands, sandstones and marls.

The contrast between the eastern and western development is, however, very great. The following section for Yorkshire is given on p. 210 in Woodward's Geology, ed. 1887:—

		Feet
Upper Permian or Magnesian Limestone Series (Zechstein).	6. Upper red marl and sandstone	50
	5. Upper magnesian limestone	120
	4. Middle red marl, sandstone and limestone	200
	2 & 3. Lower magnesian limestone	120
Lower Permian (?Roth-liegende).	1. White or yellow false-bedded sand (quick-sand) with occasional breccia	20 or less

The lowest bed of Sedgwick's series, so far as it represents the Pontefract sandstone of Smith, has now been proved to belong to the upper beds of the Carboniferous Millstone Grits (J. C. Ward, Q. J. G. S., xxv. 294). Between the Wharfe and the Nidd this forms an advanced escarpment ranging considerably to the west of the real Magnesian Limestone. Here it is a coarse-grained, irregularly bedded sandstone rendered purple by infiltration from the Permian and Triassic rocks above. It sometimes nearly approaches the appearance of a conglomerate, and decomposes into irregular masses, as may be well seen at Plumpton Rocks near Knaresborough. But in North Yorkshire this bed is nowhere to be seen distinctly, though numerous loose blocks which apparently belong to it occur in the glacial detritus.

The second and the fourth beds also are not anywhere distinctly known in North Yorkshire. The latter, however, may be seen near Tadcaster. The third bed or true Magnesian Limestone forms a cliff 70 feet in thickness at Knaresborough and cliffs from 30 to 50 feet thick on the banks of the Wharfe and Tees. The upper part of these is a firm cellular concretionary Magnesian Limestone and the lower part is more soft and earthy in texture.

The second bed or upper slaty limestone is seen at Thorparch, and is represented at Well and Nosterfield by a system of smoke-grey and dark bluish-grey beds of Limestone shattered so much as to resemble a highly indurated calcareous shale. The following is the section of Seven-acre quarry near Well from the main Magnesian Limestone bed upwards :—

		feet.
7.	Yellow magnesian limestone with carbonaceous stains...	3
6.	Dark shale passing into limestone	½
5.	Yellow rubbly limestone with galena, worked in 1823, now deserted	1½
4.	Dark brown and black shale, highly calcareous and semi-indurated	1
3.	Earthy yellowish beds .. ..3 or 4	
2.	Thin shattered beds of brownish blue limestone with thin seams of marl.....	12
1.	Strong yellow magnesian limestone forming the base of the quarry	
	Total	22 feet.

At Welsea quarry near Well this upper system of beds is 30 feet in thickness. The lime burnt from it may be spread over the land at the rate of six chaldrons (216 bushels) to an acre, whilst of the true Magnesian Limestone two chaldrons to an acre are about as much as the soil can usually bear with advantage. In Ripon park are beds of gypsum which probably belong to the Red and White Marls which are placed above as the top stratum of the series.

Mesozoic Age.

THE TRIASSIC SYSTEM.

(11) *The Bunter Sandstone* (often referred to as *New Red Sandstone*) and (12) *Keuper Series.*—From the line drawn from Piercebridge on the Tees, through Catterick Bridge on the Swale to Tanfield on the Yore, and Thorparch on the Wharfe, which forms the boundary on the east of all the Palæozoic deposits of North Yorkshire, beneath a tract of comparatively level country, which measures in breadth twelve miles at the narrowest part, and comprises altogether an area of 500 square miles, stretch the deposits of the Triassic series. This is, in fact, the northern

portion of that long line of valley which continues through the southern part of Yorkshire and which extends as far south as the neighbourhood of Nottingham and there expands into the great Triassic plain of the Midland Counties.

In North Yorkshire these Triassic deposits are so thickly overlaid with glacial deposits that it is only in a very few places that they are exposed to view, and until recently we could only form a somewhat vague idea of their character and thickness. It is by some considered doubtful as to how far the two series of Bunter Sandstones and Keuper Marls are here distinctive. In the new salt-producing district of Cleveland the boring by Messrs. Bolckow and Vaughan, made in 1868, showed the following series :—

	feet.
Surface deposits (chiefly glacial)	58
Red marls and clays, two beds gypsum of 2ft. and 6 ft. thickness	81
White and red sandstone with gypsum veins	1067
Rock salt penetrated to a depth of	100
Limestone and conglomerate	$7\frac{1}{2}$
Total depth reached	$1313\frac{1}{2}$ feet.*

A boring to 1,355 feet by Messrs. Bell Bros. in 1874 was similar; in this case the whole section has been preserved. Details of these borings are given in the 'Hand-book of Middlesbrough and District,' prepared for the British Association meeting at York in 1881. It will be seen that the Yorkshire salt beds appear to occupy a much lower horizon than those of Cheshire and Worcestershire. In Cheshire the series is 1,700 feet thick, and in the Severn valley about 300 feet less.

The Bunter, or lower beds, consist principally of thick sandstones, which are usually coarse in grain and, by the agency of peroxide of iron, deeply tinged with red. In Nottinghamshire this portion of the formation has an average breadth of from eight to ten miles, the soil which rests upon it being chiefly composed of light yellowish sand, but all deep sections of undisturbed beds are red. In Cheshire this part of the

* The lower parts of this section are by some assigned to the Upper Permian Marls.

series has a total thickness of 1,000 feet, the beds being conglomeritic below and more laminated and more interpolated with clays as we proceed upward. In our own field of study these sandstone beds may be seen in quarries at Ripon and Boroughbridge, and in the bed of the Tees about Croft. In two or three places in the vicinity of the Tees they have been partially sunk through in fruitless attempts at boring for coal. At Dinsdale they were excavated to a depth of 450 feet, and opposite Sockburn to a depth of 700 feet without the Magnesian Limestone being reached. Here the strata were found* to consist of white, grey or reddish sandstones, with occasional partings of a more compact nature, red or blue shale, carbonaceous matter in thick layers and gypsum in nodules or beds. In one case a bed of gypsum was found which was three feet in thickness. In sinking for the foundations of the North Eastern railway bridge over the Swale, solid sandstone was reached on the west of the river but not on the east.

The Keuper, or upper, part of the series consists principally of red marlstones, which in Cheshire are 700 feet in thickness, and in North Yorkshire may be seen in the Howardian district and about the Tees estuary. In Nottinghamshire they form the subsoil of the claylands of the eastern part of the county, their escarpment being visible in a well-defined chain of low hills, which crosses the great north road above Markham Moor. The beds sink gradually beneath the glacial deposits of the great plain which is drained by the Trent.

Rhætic Beds.—In North Yorkshire, as nearly everywhere in England along the junction of the Keuper marls and Lower Lias, these thin but remarkably constant 'passage beds' have been detected. Fifteen feet of shales, with sandy beds, rest upon some ten feet of blue or tea-green marls. They are not exposed along the coast, but at Lazenby, S.E. of Redcar, near

* The complete sections as reported by the miners engaged in these excavations were given by the late Mr. Winch, in the fourth volume of the Transactions of the Geological Society.

Stokesley, east of Northallerton, and at the entrance to the Derwent valley between Barton Hill and Kirkham Abbey stations on the York and Scarborough Railway.*

THE JURASSIC SYSTEM.

(13) *The Lias Series.*—For the typical section and for the greatest thickness of the Lias formation we must go to Cleveland, where it forms the lower part of all the moorland escarpments, and of most of the coast cliffs. Here we have it with strata as under, beginning from above.

3rd. *The Upper Lias Clay or Shale*, about 280 feet in thickness, the upper part a soft shale from which alum was till recently manufactured, characterised by *Ammonites communis*; the lower part firmer and harder, with *A. serpentinus*. In this are bands of ferruginous and argillo-calcareous nodules, and a band containing jet.

2nd. *The Ironstone and Marlstone beds*, about 470 feet in thickness, consisting of highly arenaceous shales and laminated calcareous sandstones, succeeded above by several bands of nodular and stratified ironstone, which are worked extensively.

1st. *The Lower Lias beds*, 378 feet in thickness, embracing the four zones of *Am. capricornus*, *jamesoni*, *oxynotus* and *bucklandi*, a nearly uniform mass of tolerably firm shale, with many layers of nodular ironstone, and, in some inland localities, laminated limestones at the bottom.

The greater part of the series may be best examined in the coast cliffs. It first makes its appearance from under the sands beneath the Dogger at Blea Wyke,† nine miles north of Scarborough. From this point it rises gradually to the steep cliffs at Peak on the south side of Robin Hood's Bay, where it reaches 270 feet above high water mark. Here it is thrown up

* See Woodward's Geology of England and Wales, ed. 1887, p. 247.

† Wyke or wick, when used as a termination or separate word in Yorkshire topography, always means a small bay. This 'wick' is quite distinct from the commoner ending, which is synonymous with the Latin vicus, as in Norwich, Berwick.

on the north by a dislocation so considerable that 300 feet of the Lower Shale is exposed, with 40 feet of the Ironstone and Marlstone series above it and the whole thickness of the Upper Shale. From this point to Baytown the beds range nearly level, but on the north they dip so rapidly that within little more than a mile of the village the Lower Shale again sinks beneath the surface and in a mile more the Ironstone series does the same. Opposite Hawsker only a small portion of the Upper Shale is seen at the base of the cliffs. Towards the cliff upon which Whitby Abbey stands it rises slightly, but north of the Esk as far as Sandsend the whole series is depressed beneath the surface by dislocations, and for three miles the coast is guarded by banks of glacial clay piled upon a floor composed of the sandstones of the Inferior Oolite.

At Sandsend we have the cliffs again with the Upper Shale 150 feet thick. At Kettleness, formerly noted for its extensive alum works*, the softer portion of the Upper Shale is 150 feet in thickness, the firm lower nodular band 30 feet, a band of soft shale beneath it 20 feet thick and at the base 20 feet of firm shale, and the upper Ironstone beds form projecting scars. Along the line of the Runswick stream a fault of about 40 feet elevates the beds on the north. For some distance beyond Runswick the firm lower band of the Upper Shale forms the base of the cliffs, but as we approach Staithes it rises and the Ironstone beds again appear. Not far from Staithes there is an oblique dislocation of 15 feet, depressing the beds towards the north. Along the line of the Staithes stream is a third and larger dislocation, with an effect of about 150 feet, which lifts to the top of the cliff, on the north side of the harbour, lower members of the Ironstone series of beds than are to be seen above the surface of the ground on the south side of it. In the magnificent cliffs of Boulby, which are 660 feet in height, we

* The whole series of alum works along this coast are now (1887) abandoned through the much cheaper production of ammonia alum from gas-residuals.

have a beautiful section of the series, including all its members from the top bed downward to a depth of 100 feet in the Lower Shale. From this point this lower bed sinks almost to the sea-level across Skinningrove Bay, rising again in Huntcliff to 180 feet and sinking to 50 feet at the termination of the cliff at Saltburn; and its beds form the ranges of rock which, from the sandy beach at Redcar, extend for about a quarter of a mile into the sea.

From this point the series spreads inland to form the floor of Eston Nab and its upper boundary is continued along the edge of the hills by way of Upleatham, Highcliff, Roseberry Topping, Leven Head, Burton Head, and the northern edge of the escarpment of the great moorland mass. In Roseberry Topping it attains 1,000 feet, the average rate of dip north-east towards Boulby being 46 feet per mile and due north to Eston Nab 80 feet per mile. Its upper limit is usually marked with great distinctness beneath the Oolitic sandstones, which everywhere cover it on the higher levels, but as we proceed towards the west, the upper band becomes more arenaceous in character as compared with the coast sections and was not ever worked profitably for alum. Opposite Stokesley the series attains its maximum elevation of 1,200 feet. The Esk runs down a synclinal fold or trough of the Lias and both in the main dale and along all its tributary streams the Liassic beds are everywhere exposed by denudation of the sandstone of the moor tops. From the Stokesley tract due east to the High Peak, its average dip is at the rate of 43 feet per mile, and in the direction of Whitby, eas by north, it is 55 per mile. In the dales of the great moorland mass from Snailesworth eastward by way of Bilsdale, Bransdale, Farndale, Rosedale, and Newtondale, it is also exposed by denudation, thickest in their upper parts and descending gradually along their edges as we pass from north to south. Beyond the western flank of the hill country, where the escarpment turns due south, it extends in an undulated slope which is generally about four miles in

breadth, the outer edge of which reaches as far west as the Cod Beck at Thirsk and the Swale at Topcliffe. In the Vale of Mowbray the Ironstone and Marlstone band is just traceable and the Upper Shale is best seen in Cotcliffe wood and on the banks of the stream below Osmotherley. A narrow band of Liassic beds still continues through the low country from Topcliffe in the direction of Easingwold and Sheriff Hutton. At Brandsby, 19 miles south of the point of its maximum elevation, the surface of the Lias is 280 feet above the sea-level, which gives an average declination in this direction of about 50 feet per mile. From this point it forms the lower part of the slope of the Howardian hills towards the south as far east as the Derwent.

(14) *The Lower Oolite Series.* The beds of the Lower Oolite, as shewn in the coast sections, are as follows, beginning with the uppermost, viz. :—

7. *Cornbrash*, a thin, fissile, partially oolitic limestone, 5 to 10 feet in thickness, remarkably filled with fossils.

6. *Upper Estuarine Series*, up to 220 feet in thickness, consisting of irregular beds of thick sandstone, with layers of shale and bands of ironstone nodules inter-stratified amongst them, and enclosing also one or two thin coal seams. It may represent the Great Oolite, or any of the beds as far down as *Ammonites parkinsoni.**

5. *Scarborough or Grey Limestone*, 3 to 100 feet thick, much intermixed with clays, sand and ironstone.

4. *Middle Estuarine Series*, 30 to 100 feet thick; shales and sandstones; many plant remains, iron, thin coals (including the main Moorland coals of Grimston, up to 18 inches thick), and impure jet.

3. *Millepore Series*, 8 to 30 feet, an impure limestone to ferruginous grit. The *Whitwell Limestone* of the Howardian district.

* The relationship of the North Yorkshire Oolites to those elsewhere in England is well indicated by a diagrammatic section at p. 286 of Woodward's Geology of England and Wales, second edition, 1887.

2. *Lower Estuarine Series*, with 'Eller Beck Bed' (marine) at top, 100 to 280 feet of shales, sandstones, two thin impure coal seams, with plant remains.

1. *Dogger Series*, from 10 to 70 feet in thickness, consisting of irregularly developed subcalcareous sandstones, much mixed with iron, with bands of shells and plants. This bed in some places passes by a gradual transition into the Upper Lias Shale beneath it.

The Cornbrash is first seen to emerge from beneath the strata of the Middle Oolite between Filey and Scarborough. In Gristhorp cliff, which attains 295 feet above high water mark, we have the Cornbrash and 50 feet of the upper sandstones. The strata rise towards the north and in the lower beds of sandstone here many fossil plants have been found.* In an island opposite Redcliff the third or calcareous bed is just seen at low water, but by a fault on the north side of it the beds are depressed about 140 feet and by a landslip in Cayton Bay the strata of this series are hidden altogether.

Immediately beyond the bay we have the Upper Estuarine Series again rising towards the north, and at Ewe Nab the calcareous bed rises above high water mark, to disappear in the cliffs round Carnelian Bay but to re-appear at the White Nab. From this point to Scarborough the Upper Estuarines form the great mass of the cliff, capped in one place by the Cornbrash, and the lowest stratum of the Middle Oolite, whilst a considerable surface of the calcareous bed is exposed at low water. At the Castle Hill the beds of this series are altogether depressed

* Professor Williamson refers these plant-bearing beds to the Scarborough or Grey Limestone, of which he gives the following sections, viz. :—

Cloughton Wyke and the White Nab.

	feet
Layers of nodular ironstone and argillaceous oolite	3
Clay	1
Nodular iron (the megalosaurus seam)	½ to 1
Hard blue clay, often much tinged with iron	2
Hard blue fine grained oolite sometimes ironshot	6
Hard blue limestone	14 to 20

South end of Cayton Bay.

	feet
Soft beds of argillaceous oolite	3
Sandstone and carbonaceous shales	9
Sandstone	1
Tenacious blue shale, the lower part carbonaceous (the plant bed)	4
Impure coal	¼
Alternating sandstones, ironstones and shales	25
Irony nodules	1
Hard granular bed, much ironshot	8

beneath the surface, but as we pass towards the north they rise again, and soon the Cornbrash terminates, and for some distance the Upper Estuarine, with a mass of Boulder Clay over them, make up the whole of the cliff, which here is under 200 feet in altitude. At Cloughton Wyke we have on the top of the cliff thick beds of block sandstone belonging to the lower part of the Upper Estuarines, beneath it a considerable thickness of shale with ironstone balls. Then comes the Grey Limestone series, here consisting of 6 feet of nodular shaly limestone full of shells, 1½ feet of shale, again a bed of nodular shaly limestone full of shells, 2½ feet of shale, then soft calcareous layers with shells, and lowest of all the solid subcalcareous sandstone of the third set of beds, with a few fossils and accompanied by ironstone and calcareous shale. The strata still continue to rise towards the north and soon the Middle Estuarine, Millepore and Lower Estuarine beds make their appearance, with a coal seam about a foot in thickness in the first. At Hayburn Wyke there are considerable marks of dislocation. From this point to the High Peak the cliffs rise in altitude from 296 to 585 feet above high water mark. In this long line of magnificent precipices we have very nearly the whole of this series of strata exposed so as to allow of ready examination, for although opposite Staintondale a landslip hides the lower part, yet by combining what is seen on the north and south of it we obtain an excellent section as follows, viz. :—

6. *Upper Estuarines*, 40 feet : carbonaceous gritstone with black shales and carbonised wood. This is quarried at the edge of the cliff.

5. *Scarborough (or Grey) Limestones* (marine), 30 feet : shelly limestone with *Belemnites giganteus*, and shales.

4. *Middle Estuarines*, 120 feet : sandstone and shale beds in numerous alternations, with fossil plants and traces of coal.

3. *Millepore-bed* (marine), 10 feet.

2. *Lower Estuarines*, 320 feet : 60 feet chiefly thick sandstone ; 200 feet thick shales and thin sandstones in numerous

alternations, with fossil plants; 20 feet white gritstone; 6 to 10 shale, 20 feet of gritstone with ironstone and fossil plants, 10 of shale.

1. *The Dogger Beds* (best seen at Blea Wyke), 70 feet: 30 feet firm-grained, yellow, irony sandstone with layers of pebbles and numerous shells; 20 feet softer sandstone with irony masses of shells and 20 feet argillaceous fissile sandstone, also with shells. These last are probably homotaxial with the Midford Sands, which are passage beds into the Lias from the Oolite.

The thick Middle and Lower Estuarine, consisting chiefly of sandstone and shale beds, form the cap rock of most of the Cleveland hills and in most places, as far as their termination at Saltburn, cover the Lias in the coast cliffs. This set of beds may be seen inland forming scars at Arncliffe woods near Egton Bridge, Danby Crag, Huntcliffe, Roseberry Topping, Wainstones, in Bilsdale, Newtondale and many other localities. North of the Esk it attains an elevation of 988 feet in Danby Beacon, and 1057 feet in Roseberry Topping. The same shells that are found in the Dogger beds at the Peak are met with inland in Goathland dale and in the escarpment of the Cleveland hills opposite Stokesley. The coal seam of the Middle Estuarine, which is shewn on the coast north of Cloughton Wyke, is known and sometimes worked in most of the southern dales of the Esk district. The calcareous beds which intervene between the two thick masses of Upper and Middle Estuarines cannot be traced very distinctly amongst the moorlands, but they are known in some of the southern dales of the Esk and also in Commondale and Scugdale. The Upper Estuarines, and especially the massive bottom bed, or Moor Grit, of the Lower Oolite series form the higher levels of all the moorland mass along the line of watershed between the Esk, the Leven, and the Derwent, the culminating points of which attain an elevation of 978 feet in Lilhow Cross, 1419 feet in Loosehoe Moor, 1489 feet in Burton Head, and 1427 feet in Dromanby Bank. This summit of drainage is in fact the line of an anticlinal axis of these strata,

which runs east and west and from which they dip towards the north and south. Where the beds of this series sink beneath the tabular hills of the Middle Oolite, these latter rise above them in a conspicuous escarpment, so that the line from Hambleton End to Scarborough, which marks the disappearance of this series from the upper levels, is easily traceable. On the western flank of the moorlands opposite Thirsk we have upwards of 200 feet of Middle Oolite on the surface, and upwards of 600 feet of the Lower Oolite shewn beneath it as under, the surface of the series being about 850 feet above the sea level. According to Prof. Phillips the greater part is here marine. It may be divided as follows :—

5. A trace of the Cornbrash.

4. The Upper Sandstone and Shale beds, 250 feet in thickness, with ironstone and carbonaceous bands.

3. Calcareous, oolitic and shaly beds, 30 feet thick, with irony bands (equivalent to the 'Scarborough Limestone').

2. The Lower Sandstone and Shale beds, 320 feet thick, with ironstones, one 3 feet bed and several bands ; also with bands of cement nodules, and a coal seam (equivalent to Middle and Lower Estuarines).

1. Calcareous, shelly, partly oolitic ironstone, 7 to 12 feet thick, 20,000 tons to the acre, over it in some places shale with a band of ironstone nodules (the Dogger beds, with *Am. murchisonæ*).

In Phillips' Geology of Yorkshire, 1875 edition, he gives the following section, p. 30 :—

Cornbrash above.

152	feet,	Sandstone	with shale.
67½	,,	,,	resting on some 30 feet of calcareous and ironstone beds.
102	,,	,,	; coal or dark shale at middle ; calcareous at base.
114	,,	,,	, shale, &c., including 3 feet calcareous masses and ironstone.
43	,,	,,	, surmounted by 1 foot calcareous.
10	,,	Dogger beds, rich in iron, *Am. murchisonæ*.	
488½	TOTAL.		

In the Howardian tract this series forms a narrow terrace which extends from the hollow along which the York and Malton Railway runs to the Derwent at Crambeck, its beds sloping towards the east and north-east. The highest part of the ridge is towards the north-west, where it attains an elevation of upwards of 500 feet. At Crambeck, near Castle Howard station, the Millepore series is shown 60 feet above the 8 feet of Dogger, with Ironstone. It can be traced hither from Hood Hill, Coxwold and Owlston and is best seen in the neighbourhood of Brandsby and Terrington. The most noteworthy feature which the series, in this part of its course, presents is this development of the Millepore Oolite, which is well exposed in the quarries above Castle Howard station, and a corresponding change in the central calcareous bed, which here assumes an aspect of more decided difference than heretofore as compared with the sandstones which surround it. It becomes slaty and fissile and is separated from the Millepore Oolite by sandstone and blue clay. There is also a cap of this series over the Lias in the hill at Craike near Easingwold and in the Vale of Mowbray at the south end of Cotcliffe wood.

The Cleveland Basaltic Dyke.—This is a remarkable dyke of dark-coloured basaltic rock, nearly vertical in position, generally about 60 feet in horizontal thickness, which, although in some places not exposed at the surface, can be traced with tolerable certainty from within four miles of the sea, six miles S. of Whitby, by way of Goathland dale and Eskdale to Great Ayton and Stainton, across the Tees to Cockfield Fell in Durham and actually on across the Eden valley at Armathwaite, a distance of more than 90 miles in a W.N.W. direction. * The strata which it penetrates are, in Durham the Mountain Limestone, the Millstone Grit and the Coal Measures; in North Yorkshire the New Red Sandstone, the Lias and the Lower Oolite. By some geologists it is supposed to be connected with the Teesdale

* See Q. J. G. S., xl. 212; also Woodward's Geol. England and Wales, p. 570.

Whin-Sill, but it is quite evident that the Cleveland dyke is much later in the date of its protrusion than the Teesdale mass, whilst its mineral characteristics are not only distinct, but peculiar. Indeed it is probably of Tertiary age, its direction indicating a connection with the grand Irish-Scotch outburst of Miocene times. It is a dark grey or bluish-grey rock, of augite andesite, 18 or 20 feet wide in Yorkshire, and even 80 feet near Great Ayton, at its base. Generally its sides are not quite perpendicular and the beds on the north of it are somewhat depressed. In some places a tendency towards the prismatic type of structure is observable in its masses. In the neighbourhood of the Tees it is quite overlaid by glacial deposits. In the Ayton tract it forms a conspicuous ridge and at Langbargh and in Kildale it is extensively quarried for roadstone. From this last mentioned dale its course lies along the dale of the Esk for some distance in a line not far from the river. At Egton Bridge it forms a steep scar in Limber hill, on the south side of the Esk, and from thence turns south-east to the head of Iburndale, and at last, after becoming considerably reduced in thickness it is lost amongst the thick sandstones of the moorland mass not far from the point where the main branch of the Derwent takes its rise.

(15) *The Middle or Oxford Oolite Series.*—The beds of this series form the upper levels of the range of tabular hills which is situated on the south of the moorlands of the Lower Oolite. Except where it is broken through by the dales of the Derwent district this range extends continuously from within five miles of Thirsk eastward to the sea-coast, measuring thirty-five miles from east to west. The elevation of its table land above the sea-level lessens as we proceed from west to east with remarkable regularity. Hambleton End is 1289 feet high, Easterside 1048 feet, Helmsley Moors 1078 feet, Levisham Moor 882 feet, Hackness Moor 714 feet, Oliver's Mount 490 feet, and Gristhorp Cliff 295 feet. Along the whole of this line the beds of this series are escarped towards the north over the Lower Oolite with considerable abruptness. From Hambleton End the range extends due south

by way of Kepwick Bank (1234 feet), Boltby Bank (1055 feet), Whitstoncliff (1053 feet), and Rolston Scar (950 feet), the series being elevated along all this line of the western flank of the moorlands upon from 800 to 900 feet of Lower Oolite and Lias, its cliffs from this elevation overlooking the Vale of Mowbray with striking effect. From Rolston Scar the embankment, still a steep one, turns due east by way of Oldstead Bank and Wass Bank to Oswaldkirk and Stonegrave, and from this point, as well as along the south of the main portion of the range, its beds slope gradually towards the east and south till they are lost beneath the Vale of Pickering.

The general section of the series is given in Phillips' Yorkshire Coast, 1875, p. 41, thus :—

Kimmeridge Clay above.

Upper Calcareous Grit	60 feet	*Belemnites abbreviatus.*
Coralline Oolite - -	60 feet	*Ammonites vertebralis.*
Lower Calcareous Grit	80 feet	*Cidaris florigemma.*
Oxford Clay - - -	150 feet	*Belemnites hastatus.*
Kelloway Rock - -	90 feet	*Ammonites athleta.*
Clay - - - - - -	5 feet	*Glyphea stricklandi.*

Cornbrash below.

In the coast cliffs the Upper Calcareous Gritstone is not anywhere seen. The first appearance of the beds of this series as we proceed from south to north is at the remarkable promontory called Filey Brigg, where its firm upper beds, the Lower Calcareous Gritstone and the lower part of the Coralline Oolite, form a grand natural pier and breakwater. About 25 feet below the surface of the Calcareous Gritstone is a more arenaceous band than the rest, which contains a number of hard siliceo-calcareous balls, and this band with its imbedded natural cannon balls is constant throughout the range of this bed and may be seen both in the Scarborough Castle hill and the cliffs on the western flank of the range of hills near Thirsk. About a mile on the north of Filey the Oxford Clay appears; and in Gristhorp cliffs we have, beneath 8 feet of Boulder Clay glacial beds, 30 feet of the lower part of the Lower Calcareous Gritstone, 40 feet shewing a gradual transition between this and the Oxford Clay, 120 feet of the

Oxford Clay, 25 feet of the Kelloways Sandstone, with 55 feet of the beds of the Lower Oolite series beneath them. At Redcliff, by the 140 feet dislocation of which we have already spoken, we have on the north the Kelloways band brought nearly down to the shore and the whole series shewn in the cliff of 285 feet as high as the lower part of the Lower Calcareous Gritstone. By the landslip in Cayton Bay we have the Oxford Clay brought down to the shore-level, with a cliff of Lower Calcareous Gritstone over it. Between the White Nab and Scarborough only the Kelloways sandstone is seen, and this caps the Lower Oolite only in one particular locality. In the Castle hill at Scarborough we have all the beds from the Coralline Oolite, 40 feet in thickness, downwards, with a remarkable dislocation on the northern face of the hill by which a narrow band is uplifted so that the Kelloways Sandstone is brought to a level with the lower part of the Lower Calcareous Gritstone on either side of it. At the pier the Kelloways Sandstone occupies the shore, but on the north of the Castle hill, except in the uplifted portion, we have the Oxford Clay 135 feet in thickness. In the low cliffs on the north of Scarborough the beds rise gradually, and before we reach Scalby the series disappears, and is not again seen.

The Upper Calcareous Gritstone covers the Coralline Oolite in various inland localities, as at Silpho Brow near Hackness, and in several places in the low ground about Kirby-moorside, Helmsley and Ampleforth. The Coralline Oolite and Lower Calcareous Gritstone form everywhere the surface and upper levels of the range of moorlands, often passing one into the other by gradual stages of transition. At the western extremity of the range we have the Calcareous Gritstone well exhibited in the conspicuous precipices of Whitstoncliff, Boltby Scar and Rolston Scar, at the first mentioned station forming a perpendicular cliff just 100 feet in depth. Here the Oxford Clay below the cliffs is considerably thinner than in the coast sections; but the Kelloways Sandstone may be traced from Scarborough along the northern escarpment of the range to the Thirsk tract

with but little variation either in character or thickness.

Beside the main range of moorlands which have been described a narrow terrace of the beds of this series stretches from the Gilling hollow opposite Stonegrave eastward to the Derwent by way of Hovingham, Barton and Malton, bordering the Howardian terrace of Lower Oolite on the north, its beds sloping towards the north-east till they sink into the vale of Pickering.

(16) *The Upper Oolites. Kimmeridge Clay* (*part of Speeton*) *Series.*—The latest deposits of the Oolitic period which we have in Yorkshire are a series of argillaceous beds which overlie the limestones of the Middle Oolite and which correspond partly to the Kimmeridge Clay which underlies in the South of England the Portland Limestone and partly to the Lower Cretaceous formation. On the coast of the East Riding we have, rising from beneath the Chalk at Speeton to a height of about 200 feet above the high-water mark, a series of beds of dark blue clay, which in some places are much contorted and interlaminated with nodules of argillaceous ironstone. Within a mile of their first appearance they sink beneath the shore-level and till we reach Filey Brigg the coast line is guarded by massive banks of glacial deposits. Judging from the fossils of these beds the upper portion of them is coeval with the Neocomian or Lower Greensand which in Sussex and Cambridgeshire underlies the chalk, and the lower part with the Kimmeridge Clay. This lower part stretches round the edge of the beds of the Middle Oolite series to Helmsley and Kirby-moorside and in its inland course lower beds than any of those which are exposed in the coast section are seen, with thin bands of calcareous gritstone interlaminated amongst the clay and above them layers of *Ostrea deltoidea.* The beds of this series evidently underlie the whole of the vale of Pickering, which embraces an area of 160 square miles, one half of which belongs to the North Riding. South of the northern edge of the vale they are overlaid by a considerable thickness of glacial beds, but they reappear in several places along the margin of the Wolds.

Close of the Mesozoic Age.—It is evident that during the deposition of all these Oolitic strata the sea bed on the east of the Palæozoic hills was many times upraised and depressed, for although the great mass of this wide range of deposits is of marine origin, yet in some places there are, amongst the fossils which they contain, evident tokens that land was sometimes elevated above the surface of the waters in the tract where and whilst these beds were in the course of accumulation. In the East Riding there are marks of a considerable elevation of the surface, which must have taken place towards the close of the Oolitic era. A line of anticlinal axis runs from east to west and the beds slope from this line both towards the north and south. Upon the Oolitic strata the Chalk of the Wold hills rests unconformably in the same way that we have already seen the Magnesian Limestone resting upon the deposits of the Carboniferous system; and before the Chalk was deposited there has evidently been a considerable waste of the elevated Oolite, for in some places along the line of anticlinal axis the upper beds are altogether swept away and the Chalk is placed in juxta-position with the Lias. As we have it in Yorkshire the Chalk is entirely a marine deposit, but there is none of it within the limits of the North Riding.

Quaternary Part of Kainozoic Age.

PLEISTOCENE SYSTEM.

The Glacial Beds.—For a long time during the early part of the Tertiary period we may suppose the general contour of the surface of our district to have been very much as it is now, the vale of Pickering an arm of the sea, the central valley also submerged, and on the east and west of this broad gulf a mass of elevated land rising above them in the same way that the two moorland ranges rise now. Of the beds of the Eocene system down to those of a much later date we have no traces in North Yorkshire, though the shelly deposit at Bridlington

seems nearly coeval with the Crag Pliocene of the Eastern Counties. The animal remains which belong to the earlier Tertiary systems indicate the prevalence of an almost tropical climate. There is a gradual change towards the close, until the upper Pliocene beds contain fossil shells of very similar type to those now found on our coasts. At the beginning of the Recent or Pleistocene Age our islands were then only a portion of the main continent. The German Ocean, at any rate in great part, was an extensive forest. Our main rivers flowed in broad valleys far below their present level. The Ouse at York, for example, was 70 feet lower, or nearly 50 feet below the present sea level. The present main features of hill and valley, however, were already in existence. Naturally these vast forest regions were inhabited by the characteristic mammalian fauna of the period. The most notable feature is the commingling of types now confined to tropical regions, such as the elephant, rhinoceros, and hippopotamus, with others belonging to more temperate regions, as the *Bos primigenius* and *Megaceros*. The Kirkdale hyæna-den contains most of these and other mammals characteristic of this time.

A very considerable subsidence now occurred, when intense cold was the prevailing feature—the Glacial Period. All our mountains and loftier hills became glacial centres, the ice of which appears to have coalesced during the times of intensest cold into a vast ice-sheet, under which the whole of Yorkshire (and England as far as the Thames) was overwhelmed. Nothing, unless it were the highest points in West Yorkshire, remained uncovered. The local ice was constrained to move under the influence of the more extensive ice-fields produced by the Lake Mountains and Scotland. The main current, even to the sea-coast, has evidently been from the north-west, or perhaps more westerly in the northern districts. Large blocks of granite from Shap Fell, and other rocks peculiar to the Cumbrian Mountains or Scotch hills, have been raised up over the Pennine ridge, which at its lowest point is elevated 1450 feet above the sea

level. Not only are they distributed through the central valley and borne to the foot of the Hambleton Hills and the Wolds, but also carried as far as Holderness, Scarborough, and other parts of the coast-line. Naturally the main current passed over what was even then the lowest part of the ridge and swept down the Stainmoor hollow.

At times the flow towards the south-east, on reaching our eastern coasts, was diverted to the south-west by contact with a yet greater ice-sheet. This, proceeding from Scandinavia, filled the North Sea, occasionally encroaching even upon the present coast-line. Hence the soil of those parts has been in part supplied from Norway. The great central plain has also received contributions from the Lias and Oolite to the east and north-east, plainly showing that the ice-field from the Hambletons, when backed by the gigantic masses from Scandinavia, were at times more than a match for the prevailing streams from the north-west. In the most southern part of our district chalk, also, begins to form a constituent of this most heterogeneous subsoil, although it is only when we get still further south that it really becomes of importance.

The result of this inundation, so far as our field of study is concerned, has been an extensive and long continued denudation of the upraised and softer portions of the surface and the deposition of what was thus swept away in irregular beds over the valleys. Everywhere, in the shape of confused heaps of gravel and clay and sand, this glacial deposit covers the lower levels of the surface. On the sea-coast we have it on the cliff tops, and in some places, as for instance between Redcar and Saltburn, between Sandsend and Whitby, and about the Spa at Scarborough, a sea bank which rises up to a height of 100 or even 200 feet above high-water mark is entirely composed of it. In the interior of the country over an area of six hundred square miles these deposits of the glacial epoch almost entirely hide from view the New Red Sandstones of the Central Valley and the Oolite Clays of the Vale of Pickering.

A second, but less vigorous, return of similar conditions was preceded by a period of upheaval, and warm temperate climate, during which the seas were reforested and the rivers cut out deep channels almost to their former beds. Thus the Ouse at York flowed in a deep, precipitous ravine, with sides rising 50 to 100 feet. The return of cold in most places removed almost every vestige of such hollows. This time there appears to have been more of *floating* ice, at any rate at the lower levels, and gravels, false-bedded sands, etc., were produced, followed by a general levelling up of the deeper hollows, especially near the river, by brick-earths. Sometimes remote, elevated, or unusually large depressions were only partially filled, leaving tarns and ponds, which quickly changed to peat beds. Askham Bog, for instance, appears to be of this nature.

After the subsidence of this inundation we have nothing further of importance to chronicle, and so with a table of the thickness of the beds, as nearly as we are in a position to register it, and of the area of the surface which they cover, this chapter may be brought to a conclusion.

THE NORTH YORKSHIRE STRATA.	Their approximate thickness in feet.	Their approximate area at the surface in square miles.
1. Kimmeridge Clay and Lower Speeton Beds	say 300	80
2. Middle Oolite	400	200
3. Lower Oolite	800	660
4. Lias	850	
5. Trias	say 1000	500
6. Magnesian Limestone	say 200	10
7. Millstone Grit	say 1000	330
8. Mountain Limestone	say 2000	330
The Great Whin Sill	250	
		Total 2110

LITHOLOGY.

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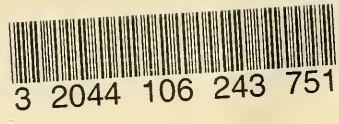
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